Established 1916 as
OIL WEEKLY

WORLD OIL

AN INTERVIEW
. . . with Secretary of Interior McKay starts on Page 44

SPECIALIZED FOR EXPLORATION, DRILLING, PRODUCING OPERATIONS AND MANAGEMENT

SEPTEMBER, 1954

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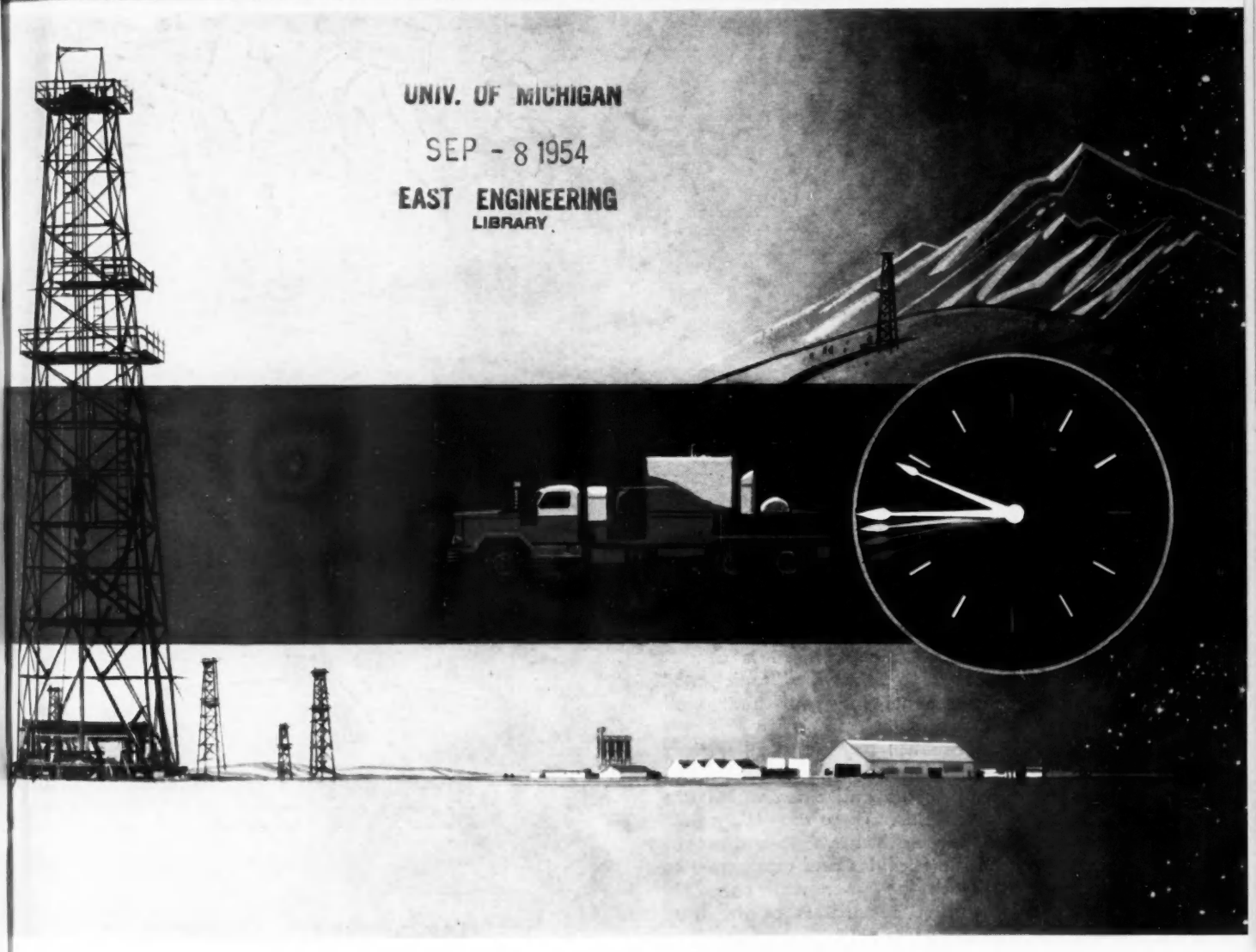

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WORLD OIL

Established 1916 as The OIL WEEKLY

Vol. 139, No. 4

September, 1954

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a quick look at WORLD OIL THIS MONTH

BUSY OIL MEN: To help you put first things first, scan these time-saving digests on this and the following pages, checking ☑ those you want to read first.

CURRENT OUTLOOK ARTICLES

☐ **How does the U. S. stand on military petroleum requirements?** Is the current depletion allowance sufficient to insure continued high drilling rates? Is government action on imports needed? See Page 44 for the answers to these and other questions of importance to the oil industry in an **Interview with Secretary of the Interior McKay** . . . . . Robert E. Spann

☐ **Arabian American Oil Company has no individual stockholders,** but the company publishes an annual report of its operations written in Arabic and English and distributes 50,000 copies around the world to tell the story of American free enterprise capital investment in a foreign land. **Establish Goodwill on a Worldwide Basis** . . . . . Page 47

☐ **General Ernest O. Thompson,** chairman of the Texas Railroad Commission and longtime sup-

THIS MONTH . . .

porter of conservation, speaks with authority on several topics of immediate and major interest to the oil industry. Turn to **Page 48** for the exclusive WORLD OIL **Interview with General Ernest O. Thompson**.....**Don Kliewer**

☐ **The Iranian oil settlement** represents, perhaps, the most important political victory by the West over Red Russia since World War II. Oil men contributed as much or more than professional foreign service officials to the defeat of the Communists on this front. Read the summary of how matters stand now and what the agreement means. **Iran: A Free Enterprise Victory** .....**Page 51**

☐ **Are you a good employer?** We asked a cross section of superintendents, engineers, foremen and miscellaneous workers to name six qualifications of a good boss. They replied in substance: "He doesn't need six qualifications. Just one." **Page 53. What Employes Would Like Most to See in an Employer**....**Al Reese**

☐ **Tulsa University's downtown college** is attracting a large number of Tulsans to a new course on the oil industry. Animated cartoons, films and models of actual oil field equipment, say the professors, "speak more effectively than mere words." Perhaps other colleges and universities might like to adopt the ideas in this article. **Animating Oil**.....**Page 56**

☐ **Markets for Montana products are continually expanding.** From its proved reserves in the Williston Basin area, the state is expected to supply portions of Washington and Oregon to the west and as far as the Great Lakes area to the east. What does the future hold? **Montana's Outlook Is Bright**....**Page 61**

EXPLORATION ARTICLES

☐ **The Arkansas Valley** area is rapidly assuming importance as a natural gas reserve although little has been said and less written about it. Discovery several years ago of commercial gas in the Hale formation (Morrow) resulted in several major companies acquiring nearly 1 million acres and embarking on intensive development campaigns which have increased the natural gas reserves in the area to more than 220,000 million cubic feet. Other areas of northern Arkansas also offer good possibilities of oil and gas. For a detailed description of the geology and prospects of northern Arkansas, read the two-part article starting on **Page 79. Oil and More Gas Promised in Northern Arkansas**.....**B. J. Scull**

☐ **The discovery of gas** in the Greenwood field in Morton County has added a sizable volume to the total proven gas reserves of southwest Kansas. Somewhat overshadowed by the nearby sprawling Hugoton gas field, the Greenwood development spreads a distance of 12 miles east to west and 18 miles north to south, with an indicated productive area in excess of 100 square miles. Beginning on **Page 84** is an article that gives the history of the discovery, a brief but comprehensive discussion of the geology, indicating the accumulation to be some type of stratigraphic trap, and a resume of field production practices. **Greenwood Gas Pool Adds to Reserves in Kansas**.**William F. Absher**

DRILLING ARTICLES

☐ **Thompson Exploration Company** has drilled more than 5000 core holes, "strat" holes and slim holes for geologic information from Florida to the Rocky Mountains. For a discussion on how "strat" and core holes differ from slim holes and a comparison of the costs, turn to **Page 117. How Strat and Core Holes Compare With Slim Holes**.....**Vernon Thompson**

☐ **A wild well in Lake Maracaibo** where water depth is 48 feet—for most drilling people, this is trouble enough. Add to it a high wind and a rough lake and the hazards multiply. For a blow-by-blow account of how a difficult blowout was controlled, turn to **Page 118. Blowout**.....**Morris R. Pitman**

☐ **Using a specially prepared oil emulsion mud,** Phillips Petroleum Company drilled 13 wells in the geologically-complex area of southern Oklahoma with remarkable results reflected in greater savings and more efficient performance. Turn to **Page 126** for a report on how the mud performed. **Special Oil Emulsion Mud Is Reducing Drilling Costs**....**R. S. Baker.**

☐ **A new rig featuring a design** which combines medium depth rig portability and fast operation with the reserve power and rugged strength needed for economical drilling of deep wells is reported. B. L. McFarland Drilling Company of Midland, Texas, just completed a well with this rig. It is entirely new in its active component parts from rotary table to the pumps. For a quick look at this interesting rig, see **Deep Drilling Rig That's Easy to Move**.....**Page 132**

☐ **When running an electrical log** in a well bore there are a multitude of factors which govern the curves recorded. The limitations in the determination of true resistivity and fluid saturations are reviewed on

WORLD OIL, published every month except semi-monthly in February and August. Entered as THE OIL WEEKLY as second class mail matter December 23, 1916, at postoffice at Houston, Texas, under the act of March 3, 1879.

General Thompson speaks out on industry's supply problems . . . page 48

Page 146. The discussion is supplemented by an extensive bibliography on electrical logging. **Limitations in Quantitative Evaluation of Electric Logs**.....**F. V. Miles.**

PRODUCTION ARTICLES

☐ **What effect will formation fracturing** have on secondary recovery operations is a question under continuous investigation by reservoir engineers and researchers. The problem is complicated by many unknowns involved in the fracture system. However, some qualitative answers may be found when some assumptions are made. This is the basis of some important research concluded by the Texas Petroleum Research Committee on the effects of horizontal fracturing on the secondary recovery of petroleum from thin reservoirs. Results of this research will be presented in a series, **Horizontal Fractures in Thin Reservoirs,** beginning with Part I on **Page 173**....**Dr. Paul B. Crawford**

☐ **Water-flooding in England,** started in 1948, has increased production rates nearly threefold. Three of Britain's four commercial oil fields are now being flooded with the fourth to be included in the program this year. With little experience in flooding, the British have done a good job. What are the results and how did they do it? The answers to these and questions on operations plus on-the-spot photographs are included on **Page 176. English Water-Flood Methods Increase Oil Recovery**.....**C. M. Adcock**

☐ **External casing corrosion** is becoming an important factor these days with high repair costs and extended life of producing wells. If so much as one ampere of current flows from the casing into the formation, about 20 pounds of steel are lost yearly. If this action is concentrated, it won't be long before the casing must be replaced or repaired. Two ways of handling this problem, by insulating flow line and cathodic protection, are described on **Page 182** in **How to Combat External Casing Corrosion**.....**Wayne A. Johnson**

☐ **A new idea applied to fracturing** the erratic Wilcox formation is paying off in South Texas. Conventional fracturing techniques failed at first because the sand grain size was too large. A new sand and more of it has increased production in both oil and gas wells. For a study of the Wilcox from the fracturing point of view, look at this new idea and a table of results on wells treated, **Page 188. Fracturing the Wilcox**.....**J. E. Kastrop**

☐ **What's been done to cut back injection rates** of flood water into zones which have no influence on oil production is reviewed on **Page 196.** A plugging agent was used effectively to stop "thief" or non-productive, watered-out oil formations, fractures, leaking packers and gas sands from taking water intended for an oil bearing horizon. What the material consists of, how it is used, and some results are presented. This method has been used successfully in more than 1500 water injection wells. **Selectively Plugging Water Injection Wells**.....**Anthony Gibbon**

☐ **A new technique in underground LPG storage** utilizes the upper part of a salt bed cavern while brine is being produced from the bottom of the cavern. An additional string of casing was required but the method is quite simple. A cross section of the well completion and method of operation are presented in **LPG Stored in Producing Brine Well**.....**Page 206**

INTERNATIONAL ARTICLES

☐ **The nemesis of the industry . . .** burning wells . . . real examples of how a tiny spark can send nature on a rampage. Here's a brief description, with pictures, of Mene Grande Oil Company's recent Lagunazo 5 blaze on Lake Maracaibo was extinguished. **Offshore Fire on Lake Maracaibo**.....**Page 219**

☐ **A Camp City Profile.** A new area is opened to civilization when oil is discovered . . . whether the location be jungle or desert. As an oil camp, Tibú, Colombia, is relatively new. It was established in 1944. But it's still rugged jungle country and oilmen commute to work each week by airplane. Turn to **Page 220. The Taming of Tibú**.....**James Joseph**

☐ **A geologist evaluates Australia** in an article starting on **Page 226.** World oil circles and the Melbourne stock exchange have felt the impact of the discovery in western Australia of oil in commercial quantities. But will the nation become a significant crude producer? This first of a three-part article outlines the possibilities as a geologist well acquainted with the country sees them. **What Does Australian Discovery Mean?**.....**Werner F. Schneeberger**

☐ **For the first time** since the Communists over-ran Hungary, the country has published "official" crude production figures in other than unintelligible percentages. But before placing too much faith in their veracity, turn to **Page 234** for a quick rundown of all Hungary's crude-producing areas and a glance at exploration activities. **Production in Hungary—17,280 or 14,550 BPD?**.....**By "Veritas"**

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PETROLEUM REFINER and THE REFINERY CATALOG for the refining-natural gasoline-petrochemical industry.
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Indexed by Industrial Arts Index and Engineering Index

Next Month . . .

WORLD OIL will devote its entire Drilling Section to material aimed at helping the drilling contractor. The main themes: Maintenance and cost reduction methods.

Here are some highlights:

- **When to Shop Drill Pipe and Drill Collars Profitably.**
- **How to Handle and Run Drill Pipe.**
- **What Every Drilling Contractor Should Know About New Drilling Techniques.**
- **The How, When and Why of Equipment Maintenance.**
- **A Refresher Course in Drilling.**

Put this on your must list of bread-and-butter reading!

LETTERS

King Tom Makes a Guess

Sirs:

The treatment of the Williston Basin in the July issue of WORLD OIL was handled in your usual workmanlike manner, and I want to compliment you. Mueller, Pohly and Harris did a thorough job on the general problems confronting the "oil finder."

I don't know who to thank for the article on Tom Leach, but my guess would be that the fine Italian hand of my old friend Tony Gibbon was responsible. (Editor's note: Good guessing.) Anyway, I appreciate the recognition . . . The article gives me considerably more credit that I deserve, but I must admit that it makes good reading. The king approach is more preferable to the granddaddy one. I am not sensitive yet about my age, but being called the granddaddy of the Basin gives me a Rip Van Winkle feeling.

TOM LEACH
North American Royalties, Inc.
Bismarck, N. D.

All Is Cozy Down in Cuba

We have read with great interest your article, "Cuban Wish Comes True," in the WORLD OIL of July.

We wish to congratulate you for the writing of such an interesting article.

JOSE LUNA Y PARRA
JORGE LUNA Y PARRA
Mexico City

Your Time Is Our Time

I wish to tell you how much I appreciated the way in which you presented the first part of my article (Time Running Out for Rumania's Oil) in the July issue of WORLD OIL. It is a distinction and a rewarding pleasure for a contributor to work with WORLD OIL.

C. G. ROSU
New York

Reference Material

Sirs:

In the June, 1954, Drilling Section . . . there appeared an article written by John N. Donhaiser and entitled "What's Being Done About Offshore Safety" . . . We would like to distribute it to our field offices located in the drilling sections of the country as technical library reference material.

M. G. BASSELL
Hartford Accident and
Indemnity Company

Popular Reprint

Sirs:

Our men enjoy your magazine very much and we think it is one of the finest. Had your company ever thought of using your best articles and publishing them in book form? (Like Permanent-Type Well Completions (March), Radoil, etc.) I have tried to cut out these pages and bind them into a book, but it doesn't always turn out satisfactorily.

JOSEPHINE GOMES
San Francisco

• *The Perma-Type Well Completions article mentioned was offered as a 24-page reprint. Total distribution was 24,075 copies.*

Looking Ahead . . .

. . . **Investment fund industry** will buy more oil stocks, a recent trend strongly indicates. During the first half of 1954, the Wellington Fund bought a total of 120,300 shares of oil stocks and sold but 14,300 shares during the same period.

. . . **A brand new plastic** may have a revolutionary application in manufacture of plastic pipe for hot as well as cold fluids. It is a polyethylene plastic developed by a major oil company and hopes are high that the product, capable of withstanding 248-degree temperature, will open new fields of uses as well as improve current polyethylene products and other plastics.

. . . **Expected soon is** a cut in federal government motor oil and gasoline use. This will result if a bill, already cleared by House and Senate, is passed. Move is part of congressional aim to reduce number of vehicles used by various government agencies.

. . . **A new flexible oil hose** for loading and unloading tankers and barges has been developed. Considerably lighter than conventional hoses, it can be bent and kinked without damage, and it will spring back into shape instantly.

. . . **No major rise in applications** by U. S. exporters is expected to follow removal of crude from the Iron Curtain embargo list, according to government circles. The reasons: Middle East crude is nearer, Russia is exporting crude and only occasional demand for U. S. specialty crudes has been noted.

. . . **The business slump** has ended if employment figures are any criteria. July unemployment of 3.3 million remained at about June's level, although normally unemployment rises in July. Total employment for the month increased by 50,000 from June, according to Commerce and Labor Departments.

. . . **No crude oil price cuts** are foreseen by Standard Oil Company of California. Vice President E. R. Peterson said his company's view stems from an expected larger increase over a year ago in the national petroleum demand in the second half than during the first six months.

. . . **Do not look** for any immediate definition of coastal areas. Too many legal complications involved, says Department of Justice spokesman. Meanwhile, Senator Long, Democrat, Louisiana, expressed doubt that new Louisiana law will affect tidelands boundary settlements. Law supports three-league line in negotiations with federal government.

. . . **A $400 million shipbuilding boom** is in the offing, thanks to bills signed by the President. Program, say government officials, is part of an unpublicized administration effort to keep the economic pump primed—even though the outlook is better than in 1953.

. . . **Future Bureau of Mines work** can be expected to deal primarily with technical oil research and statistics and to dodge any federal government program aimed at developing synthetic liquid fuels beyond the "test tube" stage.

. . . **Asphalt producers could reap millions** if the President's ambitious ten-year, $50 billion interstate highway building program gets states' approval. Cool toward it at first, National Governors Conference will meet in Chicago about September 15 to try out concrete recommendations.

. . . **Completion of more** and more new wells in Texas, despite the adverse effect on existing producers, led Maston Nixon, Corpus Christi independent operator, to tell the Texas Railroad Commission in August that too many wells are being drilled. Calling the drilling rate—13 percent greater than last year—imprudent, he said operators are carrying millions of dollars in invested capital with no return.

SANDFRAC

REJUVENATED PRODUCTION FROM SPRABERRY WELL

Large-volume, high-injection-rate treatment performed by DOWELL increased flow from 4 to 213 BOPD

A well completed in the Upper Spraberry did not maintain its initial potential of 286 BOPD. In fact, at the end of a year and a half, its production was down to 4 BOPD.

In reworking the well, the operator called Dowell engineers who recommended a high-injection-rate Sandfrac* treatment using 20,000 gallons of special refined oil with 1½ pounds of sand per gallon. The treatment was performed at an injection rate of 28 barrels per minute.

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Other wells in the Spraberry, on which this same method has been used, have gone from 25 barrels or less per day to 100, 200 and 300 BOPD. Injection rates as high as 60 barrels per minute have been attained.

Although operations on this scale are not a daily occurrence in every field, it is another example of the kind of service you can expect from Dowell. A call will bring experienced engineers to help you get maximum production. Telephone the nearest office, or write to DOWELL INCORPORATED, Tulsa 1, Oklahoma, Dept. I-13.

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Iranian Agreement Is Blow to Russia

The near settlement of the three-year-old Iranian oil controversy is a major historical event of the world. While sure to wield vast influence on the international petroleum situation, its real importance is the long-range effect on future world military and political affairs.

The agreement, now lacking only ratification by the Iranian Parliament, represents a bitter and significant defeat for Russia. It is an equally sweet and significant victory for the Free World and for private business enterprise. To a large degree, the settlement is the work of private business companies.

Iran's principal source of revenue has been restored, saving the country from bankruptcy. The income is expected to be used to develop irrigation projects and other rich natural resources of the country, thereby strengthening the country's stand against Communism.

Consequently, the settlement creates a new and formidable military and political buttress against the expansion of Communism in southern Asia. The chances of preventing at least a major portion of southern Asia from falling into the Soviet orbit have been enhanced many fold. A new foe against Communism has been established at a most strategic spot.

•

The importance of the agreement from a military and political viewpoint is extremely significant because of Iran's location.

Russia's high hopes of Communistic sympathizers taking over the Iranian Government have been defeated. Since Iran extends from the Caspian Sea to the Persian Gulf, this would have successfully divided the whole of Asia. With the conquest of northern French Indo-China, this would have given the Soviets control of important areas at both the eastern and western edges of southern Asia, practically sealing off south central Asia. Furthermore, Soviet control of Iran also would have placed Communism deep in the very heart of the Middle East, within an easy stone's throw of all the area's great oil fields.

Now the situation is reversed. Instead of a major victory, the new situation presents dangerous military and political implications for the Soviets.

Iran lies immediately east of staunchly anti-Communist Turkey. Like Turkey, Iran has an extensive common boundary with Russia. Together, these two countries form a strategic 2000-mile long buttress against the Soviets.

The Soviets now have new serious problems to think about before taking any action that might lead to a full-scale shooting war with the West. The Caucasian oil fields, one of Russia's two important petroleum sources, lie only a short distance north of the Iranian border. Major Russian industrial centers now are within easy bomber range of a greatly expanded area. Many of Russia's great Ural Mountain industrial centers are but 1000 miles from the Iranian border. They are over 2000 miles from West Germany and France.

Now the Free World's boundary with southern Russia extends almost to the western edge of the great Himalayas, whose average elevation of 20,000 feet forms a near-impregnable topographical barrier to modern armies, extending from Afghanistan eastward across Asia as far as Burma.

•

Much of the credit for working out the Iranian oil controversy must go to Communism's arch foe—private business enterprise in the form of the oil industry.

Eight large oil companies have agreed to jointly operate Iran's oil fields and giant refinery at Abadan, and to also market Iran's oil abroad. The Iranian Government will receive half of the profits. Iran's production is expected to reach 300,000 barrels daily in 1955, rising to 450,000 in 1956 and 600,000 barrels per day in 1957.

The willingness of the oil companies to agree to this program in the face of the current surplus supply of petroleum is noteworthy. Iran's production was not needed. Return of Iran's oil to international markets will absorb much of the increase in world consumption during the next three years.

Therefore, it is to the eternal credit of private business that eight oil companies were willing to work out plans providing for settlement of the Iranian affair in a fair manner.

Warren L. Baker

a WORLD OIL interview

INTERIOR SECRETARY McKAY

Military requirements . . .

Depletion allowance . . .

Oil imports . . .

Q. *Mr. Secretary, is the crude oil productive capacity of the domestic petroleum industry, which has been placed by qualified estimates at about 7.7 million barrels per day, adequate for defense purposes, and what is your opinion as to the need for expansion to meet a possible national emergency should it occur in the near future?*

A. In appraising adequacy of productive capacity for defense one must not lose sight of the importance of time in a constantly changing world and domestic situation. I believe that if the growth in crude oil productive capacity continues at a rate approximating that of the recent past, we may feel confident that our supply position in this respect will have a sound relation to the risks in war that may be anticipated. I see no reason to doubt that such a rate of growth will persist for some time into the future. No definitive answer to this question could be valid for long. The matter is constantly being reviewed.

Q. *Do you think the desirable level of crude oil reserve producing capacity can be achieved and maintained as provided by existing incentives in the statutory percentage depletion allowance, or would additional incentives be required, such as charging off against income taxes all geological and geophysical expenses?*

A. Under existing incentives the rate of drilling in the U. S. has increased during recent years to a record of 49,000 completions in 1953. Productive capacity is, of course, closely related to the rate of drilling and in the absence of an indication of a change in trend in the industry's drilling program, the assumption is justified that additional incentives to drill are not presently required.

Q. *The petroleum industry has been urged to build reserve refining capacity for possible defense needs. Operable refining capacity in the U. S. at the end of 1953 amounted to a daily average of 8,078,000 barrels and this will be increased further this year. In what manner can the industry carry such excess capacity and avoid disruptive influences in the refined products market such as the current oversupply of gasoline and the resultant price weakness?*

A. It has been fortunate indeed that the petroleum industry has been willing to build refining capacity to meet defense needs. The demand for petroleum products since World War II and since Korea has consistently exceeded the expectations of the industry and each year the sights have had to be raised even higher. This condition assumes more importance when it is realized that major refining units take 24 or more months from the drawing board until they go on stream even when materials are in relatively plentiful supply. Historically, there has always been reserve refining capacity in the U. S. As a matter of fact, the record shows that the present level of unused capacity as a perecntage of total capacity is considerably below pre-World War II levels. Free enterprise and economics will take care of temporary inventory maladjustments of the nature you describe, just as it always has.

Q. *From a possible defense outlook, how do you view the current over-all petroleum supply picture? Are we over the hump as far as foreseeable military needs are concerned? What about the supply of aviation gasoline?*

A. There appears to be general agreement that the current over-all petroleum supply is adequate to meet all near-term demands during mobilization. This statement applies to aviation gasoline as well as to

with Secretary of the Interior DOUGLAS McKAY

- **U. S. is "over the hump" on foreseeable military petroleum needs.**
- **Depletion allowance sufficient to insure high drilling rate.**
- **No government action on imports is needed at this time.**

These and other questions answered in this exclusive interview by WORLD OIL staffer Robert E. Spann

other petroleum products.

Q. *In May of last year in appearing before the House Ways and Means Committee on the Simpson Bill which proposed quotas on crude oil and residual fuel oil imports, you stated: "Domestic production has been reduced in recent months and there should be a corresponding cut in imports." Imports of crude petroleum in 1953 increased about 12 percent over 1952 and domestic crude oil production rose about 3 percent. What is your view on the present level of imports and what action, if any, should be taken?*

A. My views on the matter haven't changed since last May when I stated that "domestic production has been reduced in recent months and there should be a corresponding cut in imports." At that time it was also stated, "there is evidence that already the industry is effecting such adjustments." The record, as far as crude imports is concerned, shows that a peak of 707,000 barrels per day was reached in June of 1953. Every month since then has been under that figure, some months appreciably so.

Forecasts of the principal importing companies filed with the Texas Railroad Commission in January, covering the first five months of 1954, indicate anticipated crude imports of approximately 628,000 barrels per day. Therefore, even allowing an additional 10,000 to 15,000 barrels per day for non-reporting companies, imports of crude oil over the near term are not being scheduled at rates in excess of the 648,000 barrels per day average for 1953 and considerably below the peak months thereof.

While it is true that domestic production has recently been below year ago levels, I anticipate an increase in the rate of production in the very near future. The industry has been successful in reducing burdensome stocks of crude oil and fuel oils.

It appears that forces have been set in motion which will keep imports within the bounds of propriety without the need for Governmental dictation at this time.

Q. *Last year the Interior Department urged the passage of H. R. 335 introduced by Congressman Regan of Texas proposing to eliminate the waiver of second and third year rentals on oil and gas leases on the public lands. Thereafter, oil and gas producers in the public land states urged the Department to reconsider its position. What conclusions has the Department reached on this matter?*

A. This question deals with the proposal in H. R. 335 of the first session of the 83rd Congress to eliminate the waiver of the second and third years' rental on noncompetitive oil and gas leases. The Department last year made a favorable report on the bill. Since that report was submitted, some oil and gas producers have presented arguments to the Secretariat against the bill and these arguments are receiving consideration. No final decision has been reached as to the Department's future action in the matter.

Q. *In regard to the conflict between the general Mining Laws of 1872 and the Mineral Leasing Act of 1920 whereby each obstructs to some extent the fullest operation of the other, as exemplified last year by the problem on uranium mining, the Department of Interior recently received from the National Petroleum Council a study and recommendations on corrective action. What is the Department's conclusion on this matter?*

What about incentives to encourage offshore leasing?

A. With regard to conflicts between locations made under the U. S. Mining Laws of 1872, and mineral leases, particularly oil and gas leases under the Mineral Leasing Act of February 25, 1920, as exemplified last year by the problem of uranium mining in the Colorado Plateau where mineral locations were made on the existing outstanding oil and gas leases, this situation was temporarily remedied by Public Law 250 of August 12, 1953, which validated such mining claims made subsequent to July 1, 1939, and prior to January 1, 1953.

This bill, though temporary in nature, adopted the principle of multiple use for mining purposes on public lands. At the instance of the Department and of the Committee on Interior and Insular Affairs of the House of Representatives, the National Petroleum Council and the American Mining Congress were requested to study proposed legislation of a permanent nature which would permit mining under the U. S. Mining Laws and leasing under the Mineral Leasing Acts on the same land at the same time.

(Editor's note: Among three bills relating to mineral development on public lands recently approved by President Eisenhower was one providing for multi-purpose leasing.)

Q. *What will be the basic differences between federal leases on the submerged coastal lands and petroleum leases on onshore public lands?*

A. The basic differences between federal oil and gas leases covering outer Continental Shelf lands, and those covering onshore lands, are:

- Offshore leases must be issued under competitive bidding, whereas onshore leases are issued non-competitively except where the lands applied for are within the limits of a known producing field.

- Offshore leases may contain not more than 5760 acres. Onshore leases are limited to 2560 acres.

- Under offshore leases there is no acreage limit on the holdings of any one person, whereas there is an acreage limitation of 15,360 acres which one person may control in any one state except for lands under unit agreements.

- Under war or other emergency conditions the federal government has first call, at the going market price, for all oil or gas produced from offshore leases, and the federal government may suspend operations on any lease during the emergency or prohibit certain operations in the interest of national defense. These provisions are not included in onshore leases.

- Offshore leases may be kept in good standing by directional drilling, development, and operation from platforms located on adjacent lands without the requirement for unitization of the lease with its adjoining lease.

- Offshore leases which have a primary term of five years are not subject to renewal in the absence of production, whereas onshore leases may be renewed for an additional term of five years.

- Under offshore leases there is no waiver of second and third year lease rentals, whereas the second and third year rentals are waived under onshore leases.

Q. *Have considerations been given to providing some special incentives, such as lower royalties, to encourage leasing of the federal government-owned offshore lands due to the greater risks and higher costs involved?*

A. The Outer Continental Shelf Lands Act stipulates that leases issued thereunder must be issued at a royalty rate of not less than 12½ percent. The Congress, in passing this act, provided special incentives by the larger lease area permitted in one lease and by the elimination of acreage restrictions. No consideration has yet been given to provide any additional incentives.

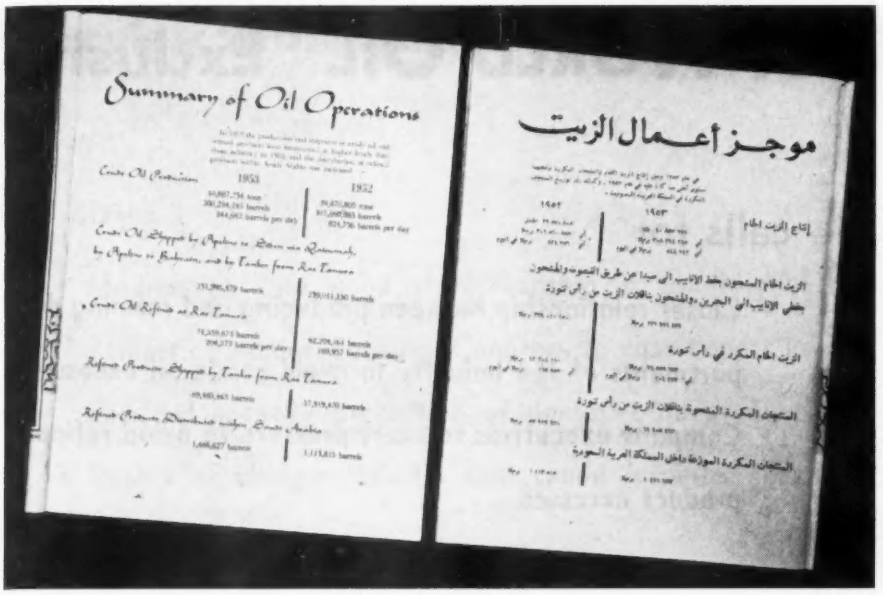
Q. *What plans have been formulated for redrawing lease agreements granted by state governments to oil producers on offshore lands now under federal jurisdiction?*

A. Section 6 of the Act provides that the leases heretofore issued by the states will be recognized. It is not planned to redraft these leases, although there may be some minor modifications as a result of the application of the operating rules and regulations.

Q. *Finally, Mr. Secretary, could you tell us something of the organization and primary functions of the reactivated Oil and Gas Division of the Department which is replacing the Petroleum Administration for Defense as the federal government's petroleum planning agency? Under this division, what will be the purpose and work of the National Petroleum Council?*

A. The reactivated Oil and Gas Division, designed to replace the Petroleum Administration for Defense, will carry on the same primary functions the division had before the organization of PAD and, in addition, will carry on the defense mobilization responsibilities for oil and gas to the extent that these responsibilities will not be completed by the time PAD is terminated. The Oil and Gas Division's principal function will be in oil and gas planning for national security and defense, serving as an adviser to me to those government agencies, including the Department of Defense and the Office of Defense Mobilization, which have need for the information and advice. It will continue the administration of the Connally "Hot Oil" law.

The purpose and work of the National Petroleum Council will continue on the same basis as it has since that council was first organized. —**The End**



Arabian American Oil Company publishes an annual report of its operations in Arabic and English and distributes 50,000 copies to . . .

Establish Goodwill on A Worldwide Basis

CORPORATE ANNUAL reports to stockholders in the petroleum industry range from simple cut and dried year-end financial statements to large descriptive studies making liberal use of color photographs and charts to portray company operations. Most large corporations have learned that an informative report is a big aid in building good stockholder relations.

Arabian American Oil Company has pioneered with a new twist for building goodwill to groups other than stockholders by use of its annual report. The company, which is known as Aramco, is owned by four other oil companies—Socony-Vacuum Oil Company, Standard Oil Company of California, Standard Oil Company (New Jersey) and The Texas Company—and has no individuals as stockholders. Nevertheless, Aramco this year distributed 50,000 copies of a 130-page, bi-lingual report with color photographs and numerous charts and other illustrations to describe the successful operation of American free enterprise capital abroad.

Distribution of the report is worldwide with copies going to employes, the four shareholder companies, newspaper and magazine editors, schools, colleges and public libraries. The distribution list of 50,000 names is not just one hatched up by a company eager for publicity, but is a list developed from written requests to the company for copies of the report. The list has been increased every year.

The 1953 Aramco report is the sixth annual report to be circulated publicly. It is the yearly report the company makes to the Saudi Arabian government under the terms of its concession agreement. The latest report covered the year which marked the twentieth anniversary of the company's development of the Saudi Arabian oil resources. Printed in Arabic as well as in English, the document is illustrated with 88 photographs, 5 maps, 10 charts and 8 tables. It has three times as many pages and photographs as did the report for 1948, the first to be released publicly.

Extending beyond the scope of the average annual report, the Aramco document outlines the oil and extensive non-oil phases of the company's operations. It offers detailed accounts of the year's production, refining and exploration activities. It also describes the progress of the training programs for Saudi Arab employes, and the community, industrial, medical, and agricultural developments which Aramco is fostering within Saudi Arabia.

The sections dealing with Aramco's non-oil operations give an account of the many enterprises which occupy much of the company's attention. The facts about the advancement of Saudi Arabia attract considerable interest among readers, especially those outside the oil business. For this reason, the report has become an excellent public relations medium.

Written in non-technical language the report gives considerable information about the people of Aramco, their housing and recreation and the health programs instituted for their benefit. It tells how the building of new townsites, home loans for Saudi Arabs, the encouragement of private industries, and education programs are contributing to the welfare of Saudi Arabia and its citizens.

Being bi-lingual, the report reaches a wide readership in many parts of the world. It is of equal value to Arabic-speaking as well as English-speaking people. Students of Arabic find the report useful as vocabulary builders by comparing the English text with a modern Arabic translation. More important, Arabic readers in the Eastern Hemisphere learn considerable information of the success of American free enterprise system and the willingness of American investors to spend considerable sums abroad in non-operational as well as operational phases of business.

The English and Arabic texts in the Aramco report start from opposite directions. English reads from left to right, and the English reader starts in from the left of the report, similar to any publication written in English. Arabic reads from right to left and the Arabic reader starts in from the right, or what is considered backwards to an English reader. The two texts meet in the center spread of the publication. There are two "front" covers, one in English and the other in Arabic. The English "front" cover is the back cover to the Arabic reader.

—**The End**

GENERAL THOMPSON

A WORLD OIL Exclusive:

He calls for

- **Closer relationship between producing and refining departments of the industry to avoid crude oil excesses.**
- **Company executives to exert pressure to avoid refined product excesses.**

By DON KLIEWER, WORLD OIL Staff

Q. *General, what are the underlying factors which have caused an oversupply of crude in the U. S. during 1954?*

A. Overproduction of crude and naturals, condensates and distillates, have, along with disappointingly small increase in demand, caused oversupply of crude.

Notice should be taken in the industry statistics of some 450,000 barrels daily of naturals, condensates and distillates, which in crude equivalent amount to some 900,000 barrels daily.

The increase in imports has also been supplanting domestic crude and contributed to the oversupply.

The optimism of the producing and refining departments of the industry due to such great expansion over previous years was extended into this year of 1954; and, whereas former growth in products had been 8 to 11 percent, the first half of 1954 has shown an increase of only a fraction of the expected 4 percent increase.

Drilling, fortunately for the national security, has gone ahead unabated; and therefore our daily reserve producing ability has steadily increased to the point where we could easily produce 1.6 million additional barrels of crude, if and as needed, from domestic oil wells.

Q. *In your opinion, what steps or practices would enable the industry to best avoid crude oil excesses in the future?*

A. There should, in my opinion, be a closer relationship between the producing and refining departments of the industry. There seems to be little coordination at present between these divisions.

We know that the industry can operate smoothly with crude stocks of 260 to 265 million barrels, whereas we have 279,277,000 barrels above ground in crude stocks, and gasoline stocks of 158 million barrels, which is about 18 million barrels more than needed on hand at the close of the heavy gasoline-consuming season.

Experience has shown students of the stocks-above-ground situation that the only way to control oversupply of crude and refined products is to not allow more crude to be produced or imported than is necessary to meet required runs for ample stocks, but never more than ample stocks.

The states can control the domestic production, and surely the Congress or the Executive can control imports if business statesmanship fails to show proper restraint and be within reason on imports.

Q. *What are the underlying factors which have caused an oversupply of refined products in the U. S. during 1954?*

A. The great increase in new refining capacity and the active use of this capacity at about 85 percent, whereas much of these new plant additions were to be stand-by, and appreciated depreciation was granted on this basis. Then, too, the demand was disappointing, as above mentioned.

Q. *Again, in your opinion, what steps or practices will enable the industry to best avoid refined product excesses in the future?*

A. Our law on market demand specifically excludes jurisdiction over refining operations; therefore, orders on such operations are not authorized. But the industry jeopardizes the 27½ percent depletion recognition in the tax laws whenever it gets over-ambitious and greedy in trying to run more crude through stills than is needed. It is strictly a problem for the executives in the companies. I cannot see how they can run a plant 85 percent capacity when they took 25 percent depreciation on the theory they needed only a small percent of the plant's capacity. Again, there should be made use of intercom phones between the producing, refining, and marketing departments of each company.

Our only concern, of course, as a conservation body, is to prevent

Interview with General Ernest O. Thompson

He says

- **Moderation and good statesmanship in handling of Iran's oil can prevent domestic clamor causing Congress to pass import laws or to hike duties for national security protection of domestic oil production.**
- **Import of cheaper Middle East crude "cramps" Texas.**

physical waste in the production of oil and natural gas in Texas. We are by law required to limit production to market demand for crude. As long as buyers of crude bid for more oil than they really need, there will be surpluses of crude and products wastefully carried in stocks above ground. All states who produce oil should share ratably in the demand for crude in the percentage that the state's oil reserves bear to the nation's reserves, or reasonably near that amount.

Q. *Iranian production is due to soon commence again. What influence do you think this will have on the U. S. oil industry?*

A. Happily, the Iranian reopening of her oil wells is in strong hands. I mean by that, the companies in the consortium (the group of eight companies which have negotiated with Iran on restoration of that nation's oil to world markets in an orderly fashion. The companies are Gulf Oil Corporation, Socony-Vacuum Oil Company, Standard Oil Company of New Jersey, Standard Oil Company of California, The Texas Company, Anglo-Iranian Oil Company, Compagnie Francaise de Petroles, and Royal Dutch/Shell), are all amply able to reduce their oil production in other Persian Gulf countries in proportion to and compensating their increase in the take of oil from Iran. This is only fair, since they upped their take collectively by 650,000 barrels per day when Iran closed down three years ago.

Since these strong companies are also strong U. S. domestic companies, I truly believe these people will want to preserve good will at home and protect the domestic producing industry so it may always be strong and able to supply oil for our national defense. We know foreign oil will be denied us, come war. I expect to see no Iranian oil come to our shores. Also, I do not expect to see other oil displaced by Iranian oil slip into this country. The production of these other Persian Gulf

In this interview, General Thompson referred to the following figures so that the interview would be more informative and the data specific.

Oil statistics compiled by American Petroleum Institute for week ended Aug. 6, 1954, with changes from the previous week and total for a year ago (in barrels).

	August 6, 1954	Changes From July 30, 1954	August 7, 1953
Gasoline Stocks	156,808,000	— 1,594,000	141,479,000
Gasoline Production	23,756,000	+ 430,000	23,959,000
Residual Fuel Oil Stocks	55,238,000	+ 587,000	49,488,000
Residual Fuel Oil Production	7,485,000	+ 66,000	8,576,000
Gas, Oil, Distillate Stocks	105,077,000	+ 4,638,000	106,460,000
Gas, Oil, Distillate Production	9,619,000	— 675,000	9,664,000
Kerosine Stocks	32,539,000	+ 1,171,000	31,220,000
Kerosine Production	1,975,000	— 86,000	2,034,000
Refinery Runs Daily	6,744,000	— 83,000	7,063,000
Percent Operated	81.8%	— 1.0%	91.6%
Crude, Condensate Output Daily	6,153,450	— 101,500	6,538,250
California	970,600	— 2,900	1,009,500
Illinois	177,300	— 2,600	162,250
Kansas	332,200	— 4,900	308,900
Louisiana	648,250	— 21,450	709,650
Oklahoma	485,100	+ 14,500	550,300
Texas (All)	2,565,800	— 55,800	2,849,100
Texas (West)	819,200	— 18,000	929,150
IMPORTS:			
Total	999,500	+ 133,700	880,200
Crude Oil East of California	639,200	+ 75,300	557,400
Residual East of California	314,800	+ 100,200	202,700
Crude Oil, California	17,600	— 32,000	115,100

countries should be reduced so that this slipping by of other oils cannot occur.

In case these companies do not use moderation and good statesmanship in this matter, there will be a clamor so strong that Congress will pass strict import regulations, or duties will be increased for national security protection of domestic oil production just as was wisely done lately by the President in the case of imported watches (see Views of the News, page 73). That move was made to keep skilled mechanics gainfully employed in peacetime available for defense work, come war.

Q. *General, what is the impact of Middle East oil on the Texas oil producing industry?*

A. There are only 439 oil wells in the Middle East as of now (August, 1954). In 1953 they produced 2,415,000 barrels of oil per day, which was 17 percent more than produced in 1952. The increase in 1952 over 1951 was 7 percent. These wells produce at rates from 4000 to 11,000 barrels per day.

The great increase in Middle East oil production has made it possible to lay down Middle East crude in Atlantic ports cheaper than similar West Texas crude can be delivered to the North Atlantic Seaboard. This is true even after the 10.5 cents a barrel duty is paid to enter the U. S.

The temptation, of course, is to use the cheaper crude—cut Texas takes on purchases and make more money for the stockholders. It cramps Texas.

Q. *Finally, General, the Federal Power Commission has been authorized to fix prices of natural gas at the wellhead. Is this causing any steps to be taken by the Texas Railroad Commission in regard to their regulations?*

A. The Federal Power Commission action on natural gas has not caused the Texas Railroad Commission to change any regulations to prevent waste, or any other regulation. We act under Texas statutes. They have not been changed in years. The Texas Commission is a waste-prevention commission empowered to prevent physical waste in the production of oil and gas.

The Courts Say . . .

in recent insurance cases

Shelton

This column is to inform—not advise. It presents the current trend in legal thinking on insurance cases. The law varies from state to state and its application depends upon the facts of the particular case. Do not attempt to apply it without consulting your attorney.

By Joseph M. Shelton, Attorney at Law, Dallas

That crew member in driller's auto was not entitled to compensation

ROUGHNECK WAS KILLED in an antomobile accident while on way to rig. He was a passenger in the driller's automobile. By custom the contractor did not pay any transportation but he did furnish a water can which was regularly transported by the crew. Roughneck helped fill the can and load it on this occasion. Every member of the crew had an automobile and transportation was "swapped out" by private arrangement. Roughneck's dependents urged that because water can was being transported roughneck was in the course of employment at the time of the fatal accident. The trial jury and court found for the roughneck's dependents.

The Texas Court of Civil Appeals said that the contract of employment did not provide the roughneck would be subjected to the risks and hazards of the streets and he was not engaged in transporting the water merely because he was a passenger in the automobile in which the water was carried. It did, however, indicate that a different view would probably be taken had the deceased been the driller-driver of the automobile.

—Travelers Ins. Co. v. Forson 268 S. W. 2nd 219 (Texas Civ. App.—Fort Worth, 1954)

That fright from witnessing co-worker's fall was not covered

EMPLOYE AND CO-WORKER were on a movable scaffold suspended by cables when one end gave way, causing the co-worker to fall a considerable distance to his death. Employe held on and escaped injury other than a bruise and cable burn—both of which completely healed. Worker claimed that in addition to these injuries he suffered from severe fright which damaged his entire nervous system. He urged that this caused him to freeze at any unusual height and made him unable to perform all of the duties of a qualified iron worker. The Trial Court jury found for the employe.

The Texas Court of Civil Appeals said the employe's condition was functional rather than organic or cellular. The entire condition resulted from fright. The neurosis here did not arise from the injuries. Under the provisions of the Texas Workmen's Compensation law defining "injury" as "The terms 'injury' or 'personal injury' shall be construed to mean damage or harm to the physical structure of the body and such diseases or infection as naturally result therefrom," it would not be a compensable condition. The Trial Court's decision was reversed.

—American General Ins. Co. v. Bailey 268 S. W. 2nd 528 (Texas Civ. App.—Galveston, 1954)

Iran: A Free Enterprise Victory

Western oil men hand Russia one of its most serious rebuffs since World War II as they pave way for return of nation's oil to world markets.

By **ROBERT E. SPANN,** World Oil Staff

The Iranian oil settlement represents probably the most important political victory scored by the Western world over Communist Russia since the end of World War II. Oil men contributed as much—if not more—than professional foreign service officials to the sweeping diplomatic defeat of the Communist on this front.

The leaders of the team of petroleum diplomats were Herbert Hoover, Jr., a consulting petroleum engineer, who spent almost a year on this assignment from the State Department and who paved the way for the talks with the representatives of the eight major oil companies who will participate in the Iranian operations; Howard W. Page, vice president of Standard Oil Company (N.J.) and chief negotiator for the group; Orville Harden, a retired Jersey Standard vice president, the original chief negotiator; H. E. Snow, managing director of Anglo-Iranian Oil Company; and J. H. Loudon, managing director of Royal Dutch Shell Group.

Whether or not the complicated working arrangements will represent an economic victory for the eight-company consortium remains to be seen. The answer to this is the calculated risk that had to be taken to reach a settlement satisfactory to all parties. The risk involved is whether or not the eight companies will be able to produce and market the required minimum volumes specified in the Iranian oil pact without causing serious oversupply and a resultant weakened price structure. Also important is the reaction to the terms of the agreement in other Middle East nations.

Financially, terms of the new pact are no better than the profit-sharing plan offered Iran a year before it expropriated the properties of Anglo-Iranian in early 1951. This is similar to the 50-50 splits of profits that became the pattern in the Middle East during the 3½ years that the Iranian oil industry lay idle and the nation moved extremely close to the Communist camp.

Politically, Iran made important gains under the agreement negotiated with the consortium representatives—gains that won't be overlooked in other Middle East nations, unusually sensitive over their individual oil arrangements. These important provisions of the preliminary agreement, which is now being rewritten into a legal document for approval by the individual consortium members and the Iranian parliament, are:

- Iran's "nationalization" law is recognized by the agreement; and
- Future operations in Iran will be by contractors—not concessionaires—with a long-term exclusive right for use of the properties now owned by Iran.

Over-all, there is little difference in the operating agreements in other Middle East nations than will be the practice in Iran. But the specific details supporting Iran's claims to all the facilities established in Iran by Anglo-Iranian and establishing two operating companies as contractors to the government—rather than concessionaires—for a 25-year period with options for three five-year extensions will get close scrutiny elsewhere in the Middle East.

Two additional basic provisions in the agreement could cause concern to other Middle East nations and to domestic producers in the U. S. The first is the separately negotiated agreement requiring Iran to pay only $70 million to Anglo-Iranian which, according to Anglo-Iranian, "is in full and final settlement of all claims and counterclaims of the parties . . ." While Iran is financially unable to make any substantial payment, the compensation agreement is at best only a token payment. The nation has ten years to pay, starting with January 1, 1957, for fixed assets valued at close to $1 billion. Anglo-Iranian, which will have a 40 percent participation in the consortium, will receive additional payments from the other companies which will have a 60 percent share in the group.

Secondly, regardless of the public statements to the contrary, return of Iranian oil to world markets is going to be felt by producers everywhere. Middle East oil has a price advantage in both the Eastern and Western hemispheres over that produced in the U. S. and Venezuela, and world demand presently is not expanding at a rate to absorb the projected minimum volumes to be produced in Iran without some cutbacks elsewhere.

General terms of the settlement provide:

- The consortium will consist of Anglo-Iranian, with a 40 percent interest, Royal Dutch Shell, 14 percent, Compagnie Francaise des Petroles, 6 percent, and an 8 percent interest each to be held by Jersey Standard, Socony-Vacuum Oil Company, Gulf Oil Corporation, Standard Oil Company of California and The Texas

Company. There are reports, so far without confirmation, that once the consortium group is officially formed, the American companies may offer participation in the consortium to other U. S. oil companies. If realized, such participation would be further assurance that either Iranian, or displaced other Middle East oil, would end up in the U. S.

• The consortium will form two operating companies, incorporated in The Netherlands and registered in Iran. One will handle producing, and the other refining, operations. These companies will act solely as "service" companies and will not own, buy or sell oil or products.

• Title to oil to be produced by the consortium will be acquired at the well-head by an Iranian subsidiary of each of the eight participating to the proportion of the companies' individual interests in the consortium. The oil will be produced and refined for the account of each local operating company by the two consortium operating companies. Each of the eight local operating companies will pay National Iranian Oil Company a one-eighth royalty based on the posted price at Iranian ports (or about 23.5 cents a barrel); then pay to the consortium operating companies the full cost of producing and/or refining plus a fee of a little more than 2 cents a barrel. This fee will be the only profit of the consortium operating companies and will be subject to a 50 percent income tax. Also, profits of the eight local operating companies will be subject to a 50 percent income tax.

• National Iranian Oil will supply all domestic demand from its Naft-I-Shah field and can buy from the consortium all additional needs for local consumption. It will pay the consortium companies the same fees to be paid by the eight local operating companies.

• Each of the local operating companies will be required to sell its crude and products at full posted prices, f.o.b. Iranian ports without the discounts that have been the rule in other Middle East nations.

Iran has been guaranteed minimum crude exports for the first three full years of operation, which are, respectively, 300,000 barrels daily, 460,000 barrels daily, and 600,000 barrels daily. The latter figure is almost the rate of production reached by Anglo-Iranian at the time of expropriation. There are no minimum guarantees of refined products exports, though the consortium companies have set targets for product exports for each of the first three years of operation of 130,000 barrels daily, 210,000 barrels daily and 260,000 barrels per day.

In effect, this means the consortium plans to restore the Abadan refinery to its previous rank as the largest in the Middle East. Abadan had a pre-expropriation capacity of 500,000 barrels daily, though considerable replacement of equipment will be required to operate the plant at a level close to this.

• All payments to Iran are to be in sterling. The British treasury has agreed to restore the convertibility privileges enjoyed by Iran prior to expropriation.

The Big Moment . . .

for Chris Dohm

CHRIS DOHM, recently elected president of Conorada Petroleum Corporation, probably would have been a research geologist had not his college roommate kept him up nights spinning tales of far-off lands.

Chris Dohm

The offer of a research fellowship in the fall of 1934 from the Mississippi River Authority sent Dohm back to Louisiana State University, from where he had been graduated the previous spring, for postgraduate work in geology. On the campus Dohm met William Chawner, now a geologist for The Carter Oil Company, who at the time had just returned to L. S. U. for graduate study after foreign service as a petroleum geologist.

The two became roommates and Chawner spent many hours telling Dohm of South America and the Far East. Dohm earned his master's degree in geology and became a researcher as a climatologist and physiographer with the U. S. Soil Conservation Service, first in Oklahoma and later at Washington headquarters.

Chawner's stories of life as a petroleum geologist lingered in Dohm's mind, however, and on a return journey to Washington after a trip to Boston he stopped off in New York between trains and applied for a job with Standard Oil Company (N. J.). That was the Big Moment.

He went to Venezuela as a geologist for Standard Oil Company of Venezuela and commenced a 12-year career in South America and the Caribbean areas. After two years in Venezuela, Dohm was transferred to the Island of Hispanola, where he spent the next 3½ years conducting geological work. His next assignment was Cuba, where Jersey Standard decided to initiate an exploration program and placed Dohm in charge of its activities there. In 1945 he was chosen to direct from Cuba the company's Northern Exploration Division which was engaged in activities throughout Central America and the Caribbean.

After becoming fully acquainted with the geology of this broad region, Dohm was invited by Walter Link to join Tropical Oil Company, another Jersey affiliate in South America, as chief geologist. A year later when Link was named chief geologist for Jersey Standard, Dohm succeeded him as Tropical's exploration manager, a position he held until he joined Conorada in 1949.

Dohm's duties as vice president in charge of exploration for Conorada have taken him to many more foreign lands than he ever heard of in college, since the company's interests extend from South America to East Africa and Egypt. His election in mid-March as Conorada's president will mean travel to many more foreign areas, a sharp contrast to his expected career as a research geologist.

We asked engineers, superintendents and others: What are the qualifications of a good boss? Their answers may surprise you. Read this and learn . . .

What Employes Would Most Like to See in an Employer

By **AL REESE,** WORLD OIL Staff

ANY SUPERVISOR, whether foreman or president, needs only one qualification to help forge an organization of loyal workers.

Authority for that is a cross-section of employes across the U. S. who replied to a WORLD OIL questionnaire.

We asked the above cross-section of engineers, superintendents, foremen and miscellaneous workers: *"What six things would you most like to see in your boss?"*

They replied: "He doesn't need six qualifications. Just this one: Look upon me as an individual . . . a thinking, feeling being to be praised if you will, blamed if you must, but never ignored as a machination of nuts and bolts to be set in motion by pressing a button, with no explanation of WHY."

None of the replies was phrased in just those words, but the paraphrasing was unmistakable. The demand to be recognized as an individual, separate and apart from all others, headed virtually every list, and in some cases was reworded time and again. An example is a foreman's list of six things he would most like to see in his employer:

1. Personal interest in each individual as to his welfare.
2. Willingness to see a man get ahead.
3. Heck when we deserve it and likewise a pat on the back when we do a worthwhile job.
4. Tell us their future plans.
5. When changes are made, explain why.
6. A gentleman always worthy of his position.

Related qualifications. Such was the emphasis upon recognition of each employe as an individual that the other qualifications mentioned could only be interpreted as suggestions for exercising the all-important attribute. These suggestions fell into five broad categories.

1. Good communications.
2. Proper delegation of authority.
3. Job knowledge.
4. Merit pay increases.
5. Fairness and firmness.

Among the miscellaneous workers, good communications were interpreted in terms of man-to-man contact. This group, thinking of the immediate supervisor, said a good employer should (1) make himself available always; and (2) occasionally review with each employe his work progress.

According to the foremen, the employer can realize good communications by:

- Explaining changes, whether of men, methods or material.
- Encouraging employes to suggest anything that might help the company, thus making communications a two-way street.
- Willingness to listen to his employes and to give help and encouragement where merited.

The superintendents and engineers evidenced a broader view of good communications. One superintendent said his boss should: "Keep me informed of details in my related work with other departments and operations that might affect public relations." An engineer declared: "An employer should keep his engineers informed on all matters of policy, whether affecting him directly or indirectly, except in those matters confidential to management."

The employes indicated that, in addition to drawing them closer to the boss, good communications are an aid to two other desirable attributes in their employers—proper delegation of authority and job knowledge.

Superintendents and engineers were particularly concerned with these qualifications in management, though sometimes for different reasons. The superintendents emphasized that the employer "should define your job in detail so that you can clearly understand your job and the scope of its responsibilities and authority." The engineers were more concerned with apportioning the work load in such a manner as to avoid burdening experienced personnel with minor details.

These two groups also emphasized somewhat different reasons for wanting greater job knowledge in their employers. The superintendents were interested in the employer having a knowledge of the job that would permit him to "make prompt decisions pertaining to operation, maintenance and capital expenditures." The engineers evidenced greater interest in such matters as "careful consideration of the practicality of design. . . . Too many automatic devices are added without knowledge of the workability of the device from installation, maintenance or operating conditions."

These differences, however, were only in the matter of approach to a common goal. The survey left no doubt that the goal itself should be the creation of circumstances in which the employe can best serve his employer, thereby winning greater recognition for himself as a valued individual.

As to the manner in which that

recognition should be bestowed, the groups were again divided as to emphasis. Returns from the miscellaneous workers and foremen were marked only infrequently with dollar signs, whereas the occasional "pat on the back" was considered of great importance. In contrast, the superintendents and engineers were strong for merit pay increases. Since the foremen and miscellaneous workers are usually in close proximity to their immediate supervisors, whereas the engineers and superintendents work more remotely, this difference in opinion may indicate that applause, personally and enthusiastically administered, can sometimes be as important as money to the machine-age man intent on recognition as an individual.

Except when prefaced by the word "merit" the employes did not once mention pay increases, though there was a scattering of suggestions that fringe benefits are an excellent yardstick for measuring the employer's interest in his employes.

Urge to admire. Other attributes the employes said they would most like to see vested in their employer were commendable personal traits, of which those most often mentioned were fairness and firmness. The ability to "make a fair decision and stick to it" was cited in virtually every reply. Other such characteristics mentioned were:

- "An employer should be civic-minded, but he should perform his duties to the public and the company with as little as possible of blatant fanfare."
- "An employer should have the poise to make himself master of any situation and a show of optimism to inspire others."
- "An employer should have a sense of humor."
- "An employer should set a good example in all things which he expects of his employe."

All of which could be accepted as evidence that employes are happier, more productive, and therefore making greater progress toward personal recognition if their employer, symbol of the company in which they are investing their working lives, is deserving of their admiration, respect and pride. —**The End**

Better Health for Executives

Your Eating Habits

Part 3

Reeve

By DR. B. B. REEVE,
Medical Director, Standard Oil Company (Indiana)

THE EXECUTIVE is the victim of his position.

Too often, you are wined and dined to death.

You cannot avoid going to interminable luncheons, dinner meetings, and cocktail parties.

Wherever you go, people who want to do business with you, and people with causes they want you to support, will take you to the so-called best places to eat in town. Men who work under you will plan where to take you, their "boss." They all seem to know the food you like best.

You're likely to become the best—but worst—fed man in the world. That, in spite of the fact that you know the truth in the old saying, "We dig our graves with our teeth."

It is essential for you to know—and observe—some of the fundamental facts of proper diet. Overeating and drinking, and improper eating, are known definitely to have detrimental effects on health. The age, the activities, and the medical history of each individual determine the amount and type of food in his proper diet. As a person grows older and less active, his body needs more protein, less fat and carbohydrates.

It is now recognized that each individual needs about 15 to 20 calories a day for each pound of body weight, varying along with the activities performed.

The end result of overeating is obesity. Obesity takes its toll by shortening an individual's life in direct proportion to the amount of overweight. Insurance companies, finding this fact demonstrated in their statistical experience, are leading the fight against obesity.

The nation has become obesity conscious. It should!

To be conscious of the effect of obesity is not enough.

The cause of overweight is excess eating.

The cure is eating less.

For the obese person, control of his excess in eating can be infinitely more difficult than learning the sheer facts about it. It is now known that a strong emotional factor is often involved in a person's overeating. Eating in itself seems to this person to be some sort of relief mechanism, related to an emotional tension he has built up. Until he is able to control—and controls—this emotional factor, this individual will not be successful about reducing.

If you are overweight, it may be enough to learn the fundamentals of foods and their caloric values. These facts may be learned easily from the books that are available in layman's language, yet accurate, or from your physician. If this is not enough, you should counsel with your physician about the problem of your overeating.

The problem is immediate, not to be given your attention just any time when you get around to it. Overweight individuals have a far greater tendency than people of normal weight to develop degenerating diseases, such as high blood pressure, diabetes, and vascular diseases.

Perhaps your health doesn't seem particularly important to you. You may think you have other, more pressing responsibilities. However, it is one of your responsibilities as an executive to remember that your company has a considerable investment in you, and that it is a business essential that you conserve your health.

As an executive, it's up to you to avoid the pitfalls of improper eating.

If you eat moderately, you'll maintain better health.

(To be concluded in an early issue.)

Note: The author is dealing in generalities. He is in no way offering relief for, nor suggesting treatment for specific ailments.

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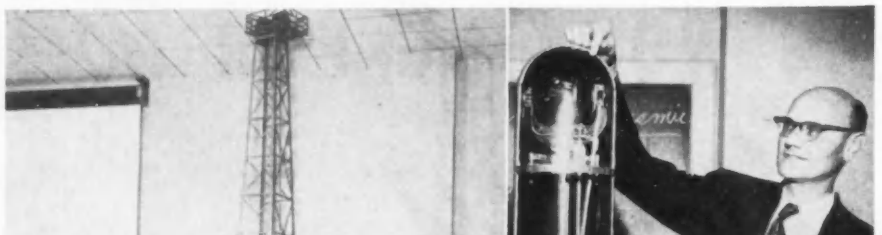

LOOK AND LEARN. Students in a new course offered by the Downtown College of the University of Tulsa learn about the oil business by looking at films, including animated cartoons, equipment, and scale models of equipment. Examining a scale model at left are, left to right: Merton H. Diels, R. D. Blaicher, C. M. Harkreader, D. N. Sharp, R. H. Tainter and A. H. Hartman. At right, W. B. Robinson, Gulf Oil Corporation geophysicist, uses a scale model to illustrate his lecture.

Animating Oil . . .

Cartoon films and scale models simplify the industry for students at the University of Tulsa.

BY USING a Walt Disney approach, the downtown college of the University of Tulsa is attracting a large number of Tulsans to a new oil industry course.

The 265 persons currently enrolled meet each Monday evening in Lorton hall auditorium on the campus to watch films—among which are animated cartoons depicting various phases of the petroleum industry.

Termed "visual aids," the films can get the most technical facts over to the viewer "much better than ordinary lectures," says Dr. Harry Gowans, dean of the downtown college.

Classes are made up for the most part of Tulsa oil company employes who have more than a rudimentary knowledge of the oil business but who want to learn more about it to help them in their jobs. By the time they finish sections covered in the course, they have studied an impressive list—evolution, exploration, rotary drilling, well completions, logging, reservoir engineering, refining, transportation, marketing, administrative control, and research.

A specialist in each field is on hand to answer questions after a film is shown. In addition, working models of oil equipment are displayed when practicable.

Cartoons Fascinate. Sometimes, the latter takes a little doing as was the case when the students were studying cementing. A new model $56,000 cementing truck was driven out to the campus and up to the back door of Lorton hall, where the students trooped outside to examine it. The process was repeated later with a fully-equipped seismograph truck.

Taking full advantage of the general public's fascination for animated cartoons, film producers have made available an array of them that deal with the most complicated subjects. One of these is called, "Gasoline's Amazing Molecules."

The producer doesn't spend time trying to explain what a carbon atom is. Instead, on the screen is flashed a cartoon character with no body and four arms attached to its head.

"This little fellow is a carbon atom," the narrator says.

Then step by scientific step, students get acquainted with more cartoon characters.

Advocates of visual aids know that it is much easier for the average person to remember a jaw-breaker like "dimethylundecane" when he can associate it with an animated drawing that looks like an Al Capp "Schmoo."

Companies Foot Bill. Tulsa oil companies are so enthusiastic about the course that many of them pay the course fees for employes. Not only that, the specialists who answer questions about the films are recruited from local firms.

"We have many $15,000-a-year and over men who double as instructors," Dr. Gowans commented.

And TU officials make no bones about the fact that they very definitely look their gift speakers in the mouth. Oilmen are screened by a committee which has been known to turn down specialists who, while competent in their fields, are not able speakers.

In general, the speakers are asked to limit their talks to ten-minute lectures. An exception was the famed Chicago research engineer, Dr. Gustav Egloff, who was allowed to talk for more than two hours.

Currently, Merton H. Diels, who directs the lectures, faces a recruitment problem. So far he has been unable to locate an oilman for the transportation section who meets the following specifications:

"A vice-president and general manager (in ten minutes) tells what his duties and problems are for a typical day."

—**The End**

ACKNOWLEDGMENT

Published through courtesy of *Tulsa Daily World*.

Montana's Outlook Is Bright

With an estimated 200-million-barrel reserve, state is ready to supply rich areas.

SUSTAINED ACTIVITY in the Williston Basin presages many new discoveries for Montana as geologists predict that half the state's area is prospective oil country. The most favorable part is said to lie east of the Front Range of the Rockies. This embraces almost 50 million acres of which about 20 million are under lease for oil.

Commercial oil was first discovered in Montana in 1915, and in 1951 the state's oil production was slightly less than 9 million barrels. However, the state had produced about 178 million barrels as the result of 6700 wells drilled prior to the discovery of commercial production in the Williston Basin. Of the total number of wells drilled to that date, 2300 or 34 percent were dry holes.

Production over the past ten years has been relatively constant. During 1952 the state produced at the rate of 26,500 barrels daily. During 1952 a total of 351 wells was completed at an expenditure, including drilling and exploration costs, of approximately $56 million.

During the past six years the refining industry in Montana has grown from 38,000 barrels per day throughput to approximately 60,000 barrels per day. The state has a total of 12 refineries of which eight were in operation during 1953 and four were shutdown undergoing modernization. Equipment has been modernized with the addition of catalytic cracking units, etc. Montana is now self-sufficient insofar as its own products requirements are concerned and is now an exporter of products.

Expanding Markets. Markets for Montana products are continually expanding. From its proved reserves in the Williston Basin area, the state is expected to supply portions of Washington and Oregon to the west and as far as the Great Lakes area to the east. Some products are now going into the Seattle area from Cut Bank via tank car, although this market is not expected to be important until additional products lines are built.

Since the discovery of oil in the Williston Basin, ten fields have been opened up in Eastern Montana, putting the state in a preeminent spot in exploration in this vast, newly-discovered oil territory.

The State of Montana owns minerals under more than 6 percent of the total land area of the state. Generally Sections 16 and 36 of each township are state land, although in some areas (some of which are in the Williston Basin) there is a considerably higher proportion of state land. About 12 percent of the state land, or about 720,000 acres, is under lease.

Future Prospects. Montana's future oil prospects may be summarized as follows:

- The intensive seismic work, which includes some 50 crews operating in Montana, is finding new oil prospects which presage considerable future drilling. The eastern half of the state has had less than 100 wildcats drilled in the search for oil since the Williston Basin discovery in North Dakota.
- It is too early to make any reliable estimates of the oil that has been found. It probably amounts to about 200 million barrels. Additional reserves will be found.
- Already, reserves discovered in North Dakota have justified a pipe line. Service Pipe Line Company of Tulsa is building a line from Beaver Lodge to Mandan, where the Standard Oil Company (Indiana) also will build a 30,000-barrel-a-day refinery. A products line from Mandan to Moorehead, Minn., has been completed by Standard and is now in operation, moving products towards Mandan. When the Mandan refinery is completed, the line will be reversed to move products from Mandan to Moorehead. The new products line provides connections into Chicago and other points. Other smaller refineries have been announced in Williston, N. D. A products line from Billings to Glendive is under discussion.

The consumption of crude for Montana markets is only about 26,000 barrels per day, and a bigger market is needed. Montana needs crude or products lines for export out of the state. Most important is a projected products line from Billings to Spokane. This line, which will be in operation the last of 1954, will fix Billings as a refinery center and will offer a market and outlet for Montana products.

- Production from Montana last year was about 26,500 barrels per day. Forecasts indicate production in Montana in 1956 will be about 58,000 barrels per day and approximately 77,000 barrels per day in 1960, or essentially treble the current rate of production. In order to attain these production rates the petroleum industry during the next eight years will have to drill 4900 wells and will spend in drilling and exploration costs approximately $800 million, or approximately $100 million per year. The total income from production during this period is estimated at $423 million, which is one and a half times the value of all the oil produced to date in Montana. After subtracting operating costs and royalty oil payments, available income is estimated at $270 million. It is indicated, therefore, that the petroleum industry during this eight-year period will require $530 million more than it will receive in income from production.

Payments High. These figures do not include additional investments and operating costs to provide for expansion of refineries, pipe lines, marketing outlets, etc., which will be necessary to profitably dispose of the large volume of crude to be produced.

Currently, total income payments to individuals in Montana is running in the neighborhood of $1 billion per year from all sources of which it is estimated the petroleum industry contributes from five to ten percent of the individual income.

ACKNOWLEDGMENT

From a talk delivered by Harold F. Moses, former vice president, The Carter Oil Company, Tulsa, in charge of exploration and research, before the Montana Bankers Association at Yellowstone, Wyo.

—The End

Europe's Governments Discourage Oil Search by Private Capital

Proposal of the Organization for European Economic Cooperation to stimulate an interest in petroleum exploration in Western European member nations faces a tough fight. Reason: Europe's socialist-minded governments are showing little desire to permit private capital to control the search for oil.

Geological possibilities for oil deposits in most of the nations are far from first rate, but OEEC experts believe the potential is promising enough to attract private capital investments if proper legal atmosphere existed and if the economic incentives were favorable. OEEC's line of attack is to get the various restrictions modified so necessary large-scale drilling programs could be possible. The organization's emphasis is for private capital—domestic and foreign—to enter the search.

OEEC has completed a survey of petroleum and tax laws, geology, previous exploration efforts, and estimates of oil reserves in each member nation. Before 1955 it hopes to publish the findings for each country with the hope that more backward nations will see the progress made in the more progressive nations and be willing to remove existing restrictions.

Petroleum exploration in Western Europe has been most successful in West Germany, The Netherlands and in the United Kingdom, all of which have laws and regulations attractive to private capital investment. It is doubtful, however, whether the laws and practices of these nations would appeal to numerous other European countries.

France presents an interesting case. For years petroleum exploration has been restricted to French capital companies, in each of which the government held a majority interest. However, the search conducted so far in France and the French Union by 10 "mixed" capital companies hasn't been impressive with the exception of the Lacq discovery made in 1949.

In 1952 France tried an experiment and, for the first time, granted a concession to a largely foreign-capital company. The concession to Esso Standard S. A. F. (owned 63.3 percent by Standard Oil Company [N. J.], 18.3 percent by Gulf Oil Corporation, and the remainder by private French capital) resulted in a major discovery last April. The company's Parentis 1 in southwestern France, near Bordeaux, flowed at a steady rate of 1100 barrels per day on quarter-inch choke—the largest flowing well on the continent, and particularly impressive when compared with France's total present output of only 7000 barrels daily.

Successful results of this experiment, however, haven't moved the French. In spite of several bids from foreign and domestic private capital companies for concessions after the strike, only one has been granted to a foreign company.

Interest stimulated by the Esso discovery resulted in numerous applications for exploration license and leases, but so far the government has operated as in the past and given the best prospects to the three companies it controls: Regie Autonome de Petroles, the largest and wholly-owned by the government, Societe des Petroles d'Aquitaine (62 percent government-owned) and SNAP (de Languedoc) (66 percent government-owned). These are the same companies that have controlled the nation's unimpressive exploration program.

Coal's Sympathizers Would Up Gas Prices

Independent producers in the clutch of the dead hand of the FPC were considering last month the stupendous irony of proffered assistance from a group bent on aiding the stricken soft coal industry.

The inter-departmental committee fluttering about the bedside of ailing coal prescribed government action to raise gas prices to a point competitive with coal. Thus, in effect, the gas industry would be saved from the noose of FPC red tape in order to give a blood transfusion to a pampered rival it has put to the sword in fair and free competition.

The policy of the U. S., declared the committee with incredible naivete, should be to take such steps as would bring the delivered price of domestic gas up to levels where it would compete on a fair basis with the price of coal and of oil. Some changes in the Natural Gas Act, it blandly conceded, will be required to permit producers to sell gas to the transmission companies at market levels without interference from the Federal Power Commission; to accord to transmission companies the current market value of gas produced by them when fixing rates at which such gas would be resold; to encourage states to adopt conservation measures in connection with the production of natural gas; and to require FPC to take into consideration the welfare of the coal and oil industries and the railroads in granting application for certificates of public necessity.

If this plan is not acceptable, the committee made the alternate suggestion that the government subsidize freight rates on coal so that coal can be delivered to points of use at prices competitive with the delivered price of natural gas.

Here is a plan that sounds more natural to the gas industry, long accustomed to being belabored by the government big stick for the titillation of more favored groups. In effect, the government would continue to smother the life out of the industry with one hand—the dead hand of the FPC—while with the other it shoved coal to market under a discriminatory schedule of freight rates.

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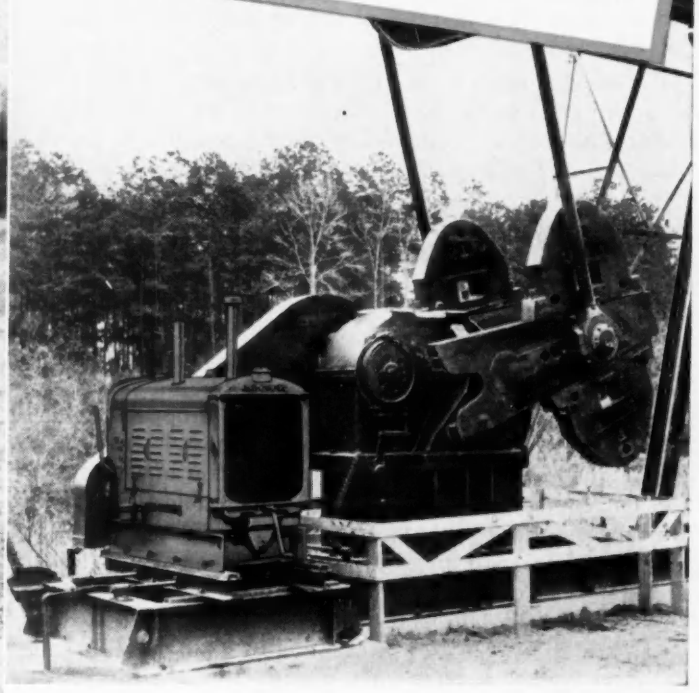

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By **RAY L. DUDLEY,** Publisher, and **WARREN L. BAKER,** Editor

Economic Position Improved

CONSIDERABLE IMPROVEMENT occurred in the U. S. petroleum economic position during the past month. Reduced refinery output resulted in needed reductions in finished product inventories, particularly in gasoline stocks. At the same time, additional cuts in domestic crude production enabled crude inventories to be kept in line, despite lower runs to refinery stills.

Consequently, much of the pressure on prices was removed. This had reached such a serious stage in early July there was danger of a general crude price cut. The chances of avoiding lower crude prices now are much better. Gasoline price advancements in the eastern territory represented a reversal of the trend existing during the previous couple of months.

However, excessive product inventory levels have not been entirely alleviated. Refinery operations need to be held at August low rates so further substantial reductions will occur in gasoline stocks. Otherwise, refiners will be crowding their luck and actually inviting future trouble. In turn, this requires that crude production be kept at August curtailed volumes, and calls for a reduction in imports.

•

BIGGEST IMPROVEMENT has been the reduction in gasoline inventories. Motor fuel stocks dropped from 165⅔ million barrels to 156⅓ million barrels between July 1 and August 13. While this reduction of 9⅓ million barrels in gasoline inventories was double the withdrawal rate during the same period of 1953, it was about in line with the downward movement for this season in years other than 1953.

Despite the larger reduction in gasoline stocks during recent weeks, these inventories are still above preceding years. However, the spread has been reduced substantially. Mid-August gasoline inventories were still 14¾ million barrels higher than a year ago, and 39 million barrels above two years ago. However, this was the lowest margin of increase to exist this year, contrasting with 18⅔ million barrels at the beginning of the motoring season on April 1 and 19½ million barrels in early July.

•

IMPROVED CONDITIONS were the result of lower refinery crude runs and reduced gasoline output. During the four weeks ended August 13 refinery crude runs averaged slightly more than 6¾ million barrels daily, compared with nearly 7 million per day during the preceding four weeks. Daily average gasoline production during the last four weeks amounted to 3,364,000 barrels, compared with 3,405,000 during the previous four weeks.

Further substantial reductions in gasoline stocks during September will be necessary if the industry is to avoid excessive inventories next spring, a condition that has plagued the industry annually in recent years. It is still questionable whether this situation can be avoided. Consequently, it is urgent that no increase in refinery runs or gasoline output takes place during the next several months.

•

ANOTHER WORRY is the residual fuel oil position. Inventories of this product have been increasing in recent weeks, and in mid-August were 5 million barrels larger than a year ago. This is the result of low demand, largely resulting from greater competition from gas and coal. There is little likelihood that residual fuel oil will recapture its lost markets, hence the output of this product must be kept at low volumes.

•

SHARP CRUDE PRODUCTION CUTS have contributed materially to the improved balance between supply and demand. U. S. stocks of crude totaled 279 million barrels in early August, the same as a year ago and as at the end of April.

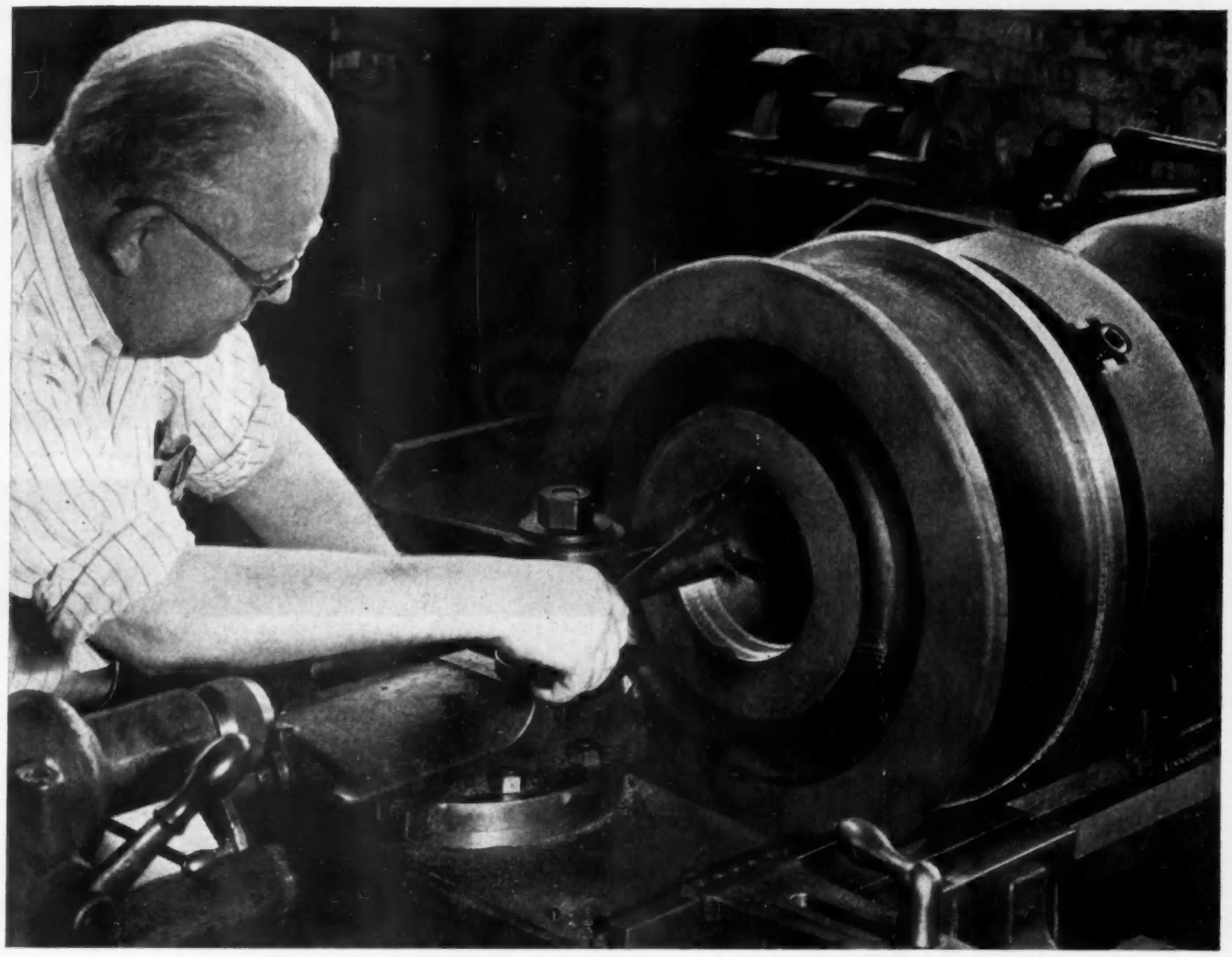
U. S. crude production in July averaged only 6,282,000 barrels daily, down 200,000 barrels from June and 321,000 barrels below year ago levels. August output will be even lower, probably averaging around 6,160,000 barrels per day in contrast with 6,583,000 barrels in 1953.

•

IMPORTERS HAVE NOT CONTRIBUTED to the petroleum industry's over-all economic improvement in the same manner as have domestic producers and refiners.

While major reductions in imports for the remainder of the year have been announced by most large importers, these mainly are merely cuts in projected increases. Actual import volumes of crude and refined products averaged 984,800 barrels daily during the four weeks ended August 13, compared with 980,000 barrels in the preceding four weeks.

Lower demand trends experienced so far this year, coupled with the U. S. stock situation, dictates that importers make reductions similar to those made by domestic producers and refiners.



Double-flanged wheel during machining at plant of Michigan Crane & Conveyor Company, Detroit.

The Number One Requirement Was Strength

That's a big, sturdy crane-track wheel in the photograph. It had to be strong to meet the top requirement of some very rigid specifications. In its original form, the wheel was a rough-machined blank, one of a number produced by Bethlehem's forging-and-rolling process for Michigan Crane & Conveyor Company.

Here the specifications called for double-flanged blanks of unusual ruggedness. Fast delivery was another consideration. Bethlehem blanks met all requirements in full, and delivery was made with plenty of time to spare. It was a good example of filling a customer's special needs in every detail, and filling them quickly.

Crane wheels, of course, are but one of the many uses for Bethlehem circular blanks. Available in a wide variety of sections, these sturdy steel blanks are produced by an exclusive process that combines the benefits of both forging and rolling. Their strength makes them entirely suitable for gears, sheave wheels, flywheels, turbine rotor wheels, and numerous other circular parts.

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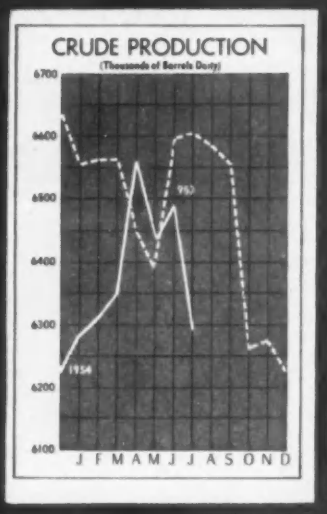
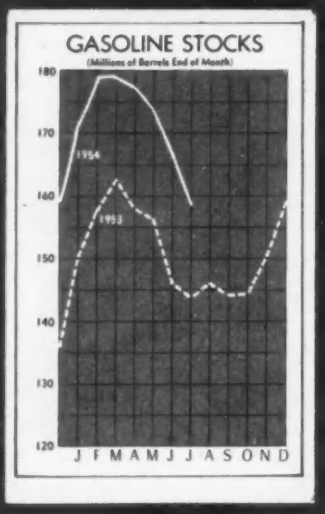
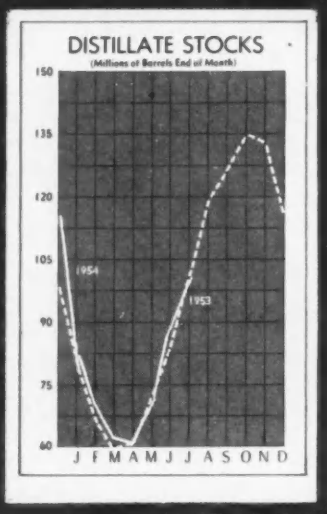
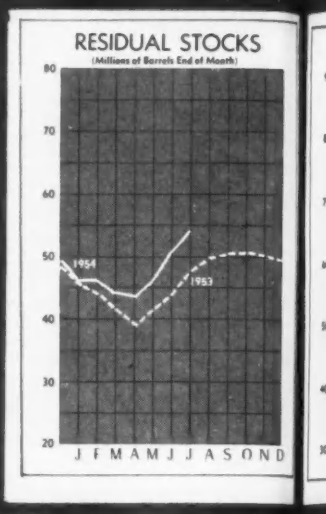
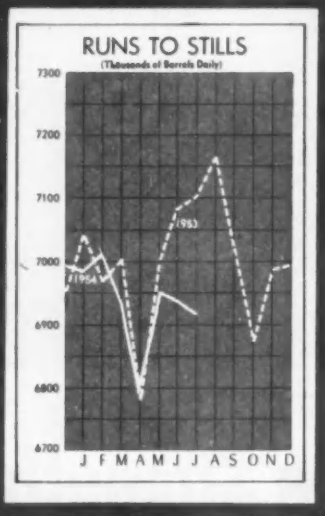
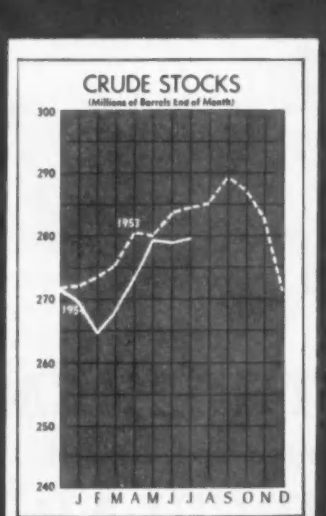












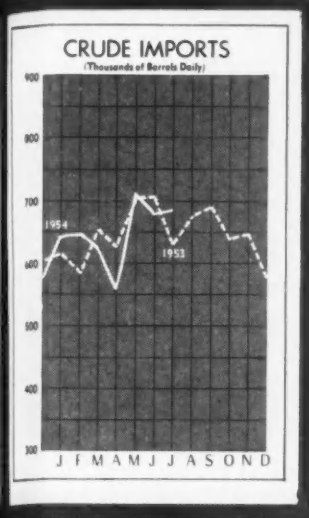
Petroleum Trends in the U. S....

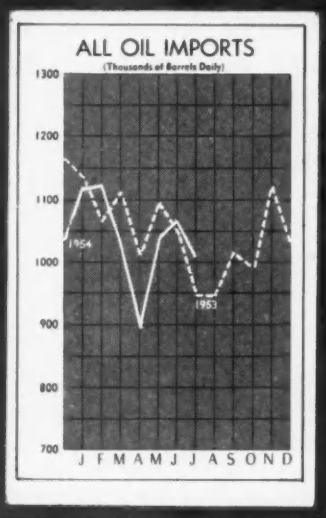
By CECIL W. SMITH, World Oil Staff

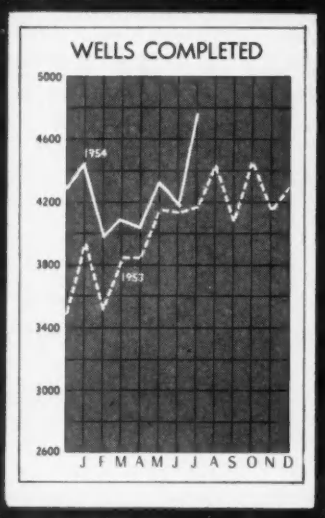
U. S. Crude Production by States

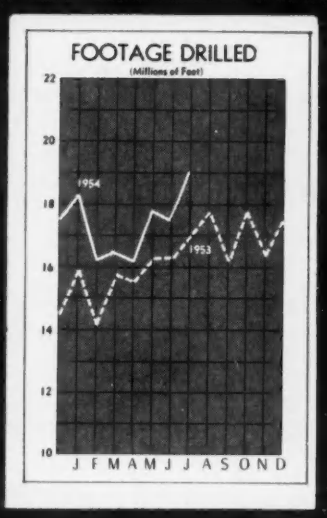
(THOUSANDS OF BARRELS)

STATE or DISTRICT	DAILY AVERAGE PRODUCTION July, 1954	June, 1954	July, 1953	% Diff. July, '53-'54	TOTAL PRODUCTION First Seven Months 1954	1953	% Diff. '53-'54
Alabama	4.3	4.4	4.8	— 10.4	945	1,008	— 6.3
Arkansas	77.0	77.7	83.0	— 7.2	16,984	17,237	— 1.5
California	977.9	988.1	1,005.9	— 2.8	209,672	216,772	— 1.0
Colorado	132.8	126.8	93.0	+ 42.8	23,452	18,020	+ 30.1
Florida	1.6	1.6	1.5	+ 6.7	329	315	+ 4.4
Illinois	183.2	187.4	157.5	+ 16.3	37,910	33,959	+ 11.6
Indiana	28.6	29.5	36.4	— 21.4	6,617	7,741	— 14.5
Kansas	330.4	327.0	331.4	— 0.3	69,454	70,299	— 1.2
Kentucky	36.0	37.4	32.5	+ 10.8	7,812	6,582	+ 18.7
Louisiana	672.4	709.1	707.6	— 5.0	148,708	149,637	— 0.6
North Louisiana	111.8	112.8	114.4	— 2.3	24,362	24,438	— 0.3
South Louisiana	560.6	596.3	593.2	— 5.5	124,346	125,199	— 0.7
Michigan	33.2	33.3	33.8	— 1.8	7,078	7,176	— 1.4
Mississippi	90.5	92.6	96.2	— 5.9	19,691	20,865	— 5.6
Missouri	0.1	0.1	0.1	...	38	14	+171.4
Montana	38.9	37.8	33.5	+ 16.1	7,487	6,596	+ 13.5
Nebraska	19.4	18.8	18.3	+ 6.0	4,005	3,413	+ 17.3
New Mexico	203.4	204.8	194.5	+ 4.6	42,780	39,900	+ 7.2
New York	11.2	11.4	10.6	+ 5.7	2,065	2,270	— 9.0
North Dakota	14.0	13.4	13.9	+ 0.7	3,045	3,065	— 0.7
Ohio	9.8	10.9	10.3	— 4.9	2,254	1,988	+ 13.4
Oklahoma	491.0	515.6	574.8	— 14.6	113,263	119,031	— 4.9
Pennsylvania	22.4	23.3	29.6	— 24.3	5,374	6,266	— 14.2
South Dakota	0.1	0.2	.....	.....	17	.....	.....
Tennessee	0.1	0.1	.....	.....	10	7	+ 42.9
Texas	2,627.0	2,764.2	2,877.1	— 8.7	576,941	606,151	— 4.8
Dist. 1—South Central	41.6	43.9	38.5	+ 8.1	8,883	7,766	+ 14.4
Dist. 2—Middle Gulf	137.0	149.8	160.5	— 14.7	30,851	33,798	— 8.7
Dist. 3—Upper Gulf	438.5	456.8	474.8	— 7.7	93,847	101,351	— 7.4
Dist. 4—Lower Gulf-S.W.	238.3	252.7	271.5	— 12.2	52,891	55,465	— 4.7
Dist. 5—East Central	43.0	45.9	49.9	— 13.8	9,511	10,513	— 9.5
Dist. 6—Northeast	331.7	353.4	378.7	— 12.4	74,272	80,833	— 8.1
Dist. 7-B—North Central	119.2	119.3	117.7	+ 1.3	26,625	23,427	+ 13.7
Dist. 7-C—West Central	178.0	189.1	165.6	+ 7.5	38,498	35,104	+ 9.7
Dist. 8—West	838.8	880.6	927.9	— 9.6	182,823	195,104	— 6.3
Dist. 9—North	178.9	192.5	184.5	— 3.0	39,902	38,180	+ 8.2
Dist. 10—Panhandle	82.0	80.2	76.5	+ 7.2	17,360	15,905	+ 9.1
Utah	5.4	5.5	4.5	+ 20.0	1,129	1,087	+ 3.9
Virginia	0.1	0.1	0.1	...	10	6	+ 66.7
West Virginia	8.0	8.1	8.7	— 8.1	1,720	1,631	+ 5.5
Wyoming	263.4	256.0	243.6	+ 8.1	53,317	47,385	+ 12.5
Total United States	6,282.0	6,485.7	6,603.2	— 4.9	1,362,107	1,383,421	— 1.6









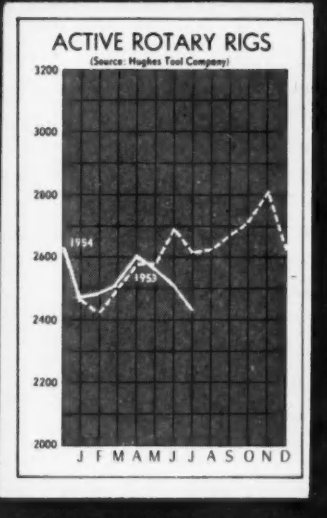
- Crude output at 6-month low . . .
- Refining rates eased slightly . . .
- Gasoline stocks situation improved . . .

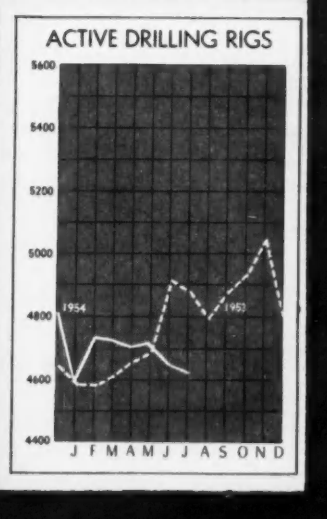
Crude Oil and Refined Products Trends

(THOUSANDS OF BARRELS)

MONTH	CRUDE OIL			GASOLINE		DISTILLATE FUEL		RESIDUAL FUEL		DAILY IMPORTS	
	Production Daily	Runs to Stills Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Production Daily	Stocks End of Month	Crude Oil	Total Oils
1952:											
June	6,197	6,825	285,964	3,169	120,166	1,455	65,911	1,228	45,688	581	911
July	6,093	6,927	275,951	3,295	116,566	1,475	85,775	1,237	52,245	597	892
August	6,219	7,118	264,368	3,377	118,592	1,514	104,257	1,252	54,061	632	879
September	6,518	7,017	264,723	3,428	120,991	1,502	117,252	1,230	56,200	615	932
October	6,518	6,883	269,776	3,301	120,062	1,458	120,721	1,203	53,052	643	1,037
November	6,487	7,049	267,852	3,416	129,509	1,510	116,096	1,299	53,069	624	984
December	6,634	6,952	271,928	3,361	136,028	1,509	99,582	1,302	48,706	603	1,165
1953:											
January	6,555	7,042	272,250	3,384	150,518	1,528	80,655	1,307	45,910	616	1,135
February	6,562	6,969	273,589	3,379	157,873	1,505	67,167	1,275	44,178	586	1,066
March	6,531	7,002	275,665	3,319	162,731	1,489	59,802	1,256	41,600	655	1,112
April	6,446	6,781	280,487	3,282	158,032	1,424	61,349	1,219	39,572	628	1,010
May	6,390	7,002	280,308	3,459	156,415	1,400	73,706	1,197	41,795	703	1,096
June	6,595	7,081	283,715	3,467	146,196	1,462	84,504	1,238	43,801	707	1,050
July	6,603	7,103	284,976	3,583	143,916	1,441	102,394	1,224	47,966	629	946
August	6,583	7,163	285,352	3,592	146,050	1,437	119,542	1,222	50,007	672	946
September	6,557	7,023	289,614	3,521	144,184	1,448	126,709	1,203	50,516	692	1,013
October	6,262	6,872	287,541	3,437	144,495	1,462	135,409	1,184	50,820	639	990
November	6,277	6,987	283,021	3,528	150,747	1,463	133,381	1,223	51,267	648	1,120
December	6,238	6,964	276,676	3,628	159,949	1,441	111,944	1,247	49,370	598	1,121
1954:											
January	6,240	6,947	270,811	3,431	171,704	1,550	81,044	1,271	47,474	617	1,143
February	6,379	7,068	266,918	3,476	179,950	1,545	70,390	1,241	47,119	621	1,144
March	6,507	6,923	271,867	3,375	181,297	1,458	60,270	1,168	44,249	654	1,088
April	6,615	6,811	280,310	3,404	177,006	1,374	61,721	1,140	44,362	574	950
May	6,471	7,038	282,250	3,482	177,606	1,372	73,581	1,148	47,009	708	1,021
June	6,486	6,939	278,636	3,375	165,575	1,388	85,693	1,163	50,564	676	1,062
July	6,282	6,922	279,744	3,378	158,174	1,412	101,101	1,108	54,735	686	1,011
July, 1954: Change:											
In Month	−204	−17	+1,108	+3	−7,401	+24	+15,408	−55	+4,171	+10	−51
In Year	−321	−181	−5,232	−205	+14,258	−29	−1,293	−116	+6,769	+57	+65
Week Ended:											
8-13-54	6,158	6,735	279,824	3,364	156,328	1,463	107,926	1,085	55,673	711	917
8-14-53	6,595	7,092	280,145	3,578	141,745	1,444	110,169	1,234	50,425	633	909

Source: Data for last two months from API; prior monthly data from Bureau of Mines.





WORLD OIL'S VIEWS OF THE NEWS

HEADLINES OF THE MONTH

• Texas ups allowable, compares production, reserves . . . • Union merger nearer . . . • What departing Congress did for oil . . . • How tax law affects you . . . • FPC regulation challenged . . . • What price convertibility? . . . • OGD needs experts.

Texas Allowable Upped

In a brief—in minutes—but thorough—by appraisal—proration hearing August 19 at the state capital, the Texas Railroad Commission:

- Hiked the daily crude allowable 67,235 barrels from allowables averaging 2,725,041 barrels in the week ended August 14 by setting September's permissive flow at 15 days for most of the state.
- Issued a comparison of wells, crude production and reserves of Texas and neighboring states.
- Summarized nominations for Texas crude for six months' period beginning September, 1954.
- Reported crude purchasers' statements concerning their imports of crude and products into the U. S.
- Tabulated replies of Texas crude purchasers concerning crude purchased in Texas and neighboring states.

And a warning, too, came officially. It developed from a decision to put various pools near Corpus Christi on an 11-day schedule for lack of demand. Commissioner William J. Murray, Jr., led to it directly by remarking that unless the situation (11-day order) is rectified soon, "we must assume that Texas is producing too much crude."

Then the warning fell from the lips of General Ernest O. Thompson, Commission chairman: "We may have to cut back the rest of the state later."

To compare Texas production of crude with that yielded by neighboring states, the Commission offered the following estimate for comparison as of July 24:

STATE	Indicated Average Daily Production Per Well	Percent of U. S. Production	Percent of U. S. Reserves
Texas	17.12	41.74	51.82
Oklahoma	7.73	8.12	6.05
New Mexico	28.48	3.30	2.82
Louisiana	43.98	10.16	9.53
Kansas	9.82	5.41	3.16
	....	68.73	73.38

Importing companies reported to the Railroad Commission that they brought a total daily average of 857,731 barrels of crude and products into the U. S. in July. Of particular importance to domestic producers was the upward trend forecast for imports, rising from 836,655 barrels a day during August to 1,033,102 barrels for December.

The September Commission hearing will be held in Austin at 9 a.m. September 17.

Union Merger Is Nearer

Oil, the last major U. S. industry to avoid a nationwide labor organization, had moved a little nearer this month toward the grip of a union ranking in size with the CIO's ten largest, and in strength with the big steel and auto organizations.

At Washington, after ten days of talk, rank-and-file committees of the Oil Workers International Union-CIO and the United Gas, Coke and Chemical Workers Union agreed on a tentative constitution for a new union which would have a membership of almost 200,000, approximately twice the size of the present oil workers' union.

The chemical workers will meet in St. Louis September 13 and the oil workers in Cleveland November 15 to ratify a constitution after acting on their differences, which are believed to be largely a matter of organizational structure and electoral procedure.

There was no apparent opposition to the merger at the Washington conclave, and no serious difficulty is expected at the St. Louis session. Most of the officers of both unions favor the merger, though Cecil Martin, secretary-treasurer of the chemical workers, has led a dissident segment. Martin, however, has been quoted as saying he will abide by the final decision and oppose the merger only in "principle."

(In a recent edition of his union's newspaper, Martin wrote: "To date, no one has advanced any argument which has in any way convinced me that the proposed merger is necessary."

(He pointed out that the chemical workers would stand to gain little—and perhaps to lose much—by uniting with OWIU. He also cited differences in operational procedures and expenses of the two unions, pointing especially to OWIU's per capita tax of $1.45, compared with $1.25 per capita tax of chemical workers.)

If both unions agree on the new organization, a merger meeting would be called, presumably about the time that O. A. (Jack) Knight, OWIU president, believes his organization will merge with independents under the Philadelphia plan—which is early next year.

Knight declared at Washington that efforts to merge OWIU with the chemical workers should help bring about a merger between OWIU and the independents. In this opinion he was not entirely in agreement with some of the independents, who are already wary of being "swallowed up" by the larger OWIU, and figure the situation would be worsened if their membership were dumped into the maw of a union comprised of both OWIU and the chemical workers.

It was apparently to better his union's chances of merging with the independents that Knight last month attempted to hasten favorable action on his union's demands for a 5 percent wage hike. Declaring that his "patience is wearing thin," the OWIU chief declared he saw no reason why companies shouldn't grant the requested increase and added that his union's no-strike pledge might be withdrawn.

What Congress Did for Oil

Republican-controlled 83rd Congress, kindly disposed to the oil industry in many ways, left its successor several knotty issues, including imports and federal control over field prices of independent gas producers.

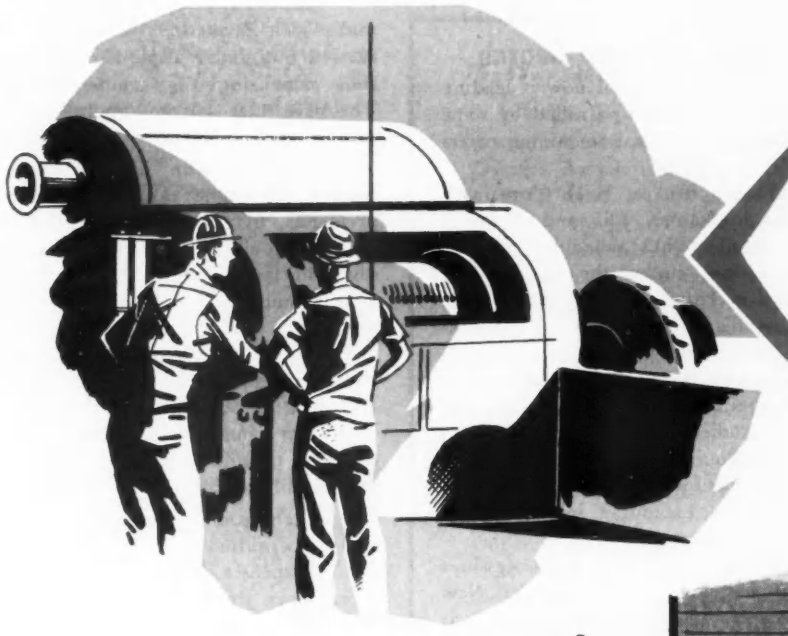
But favorable to the industry were the 83rd's decisions to:

1. Give coastal states control of submerged lands out to their historic boundaries;

2. Exempt local natural gas distributors from Federal Power Commission regulation;

3. Authorize uranium development of public lands covered by oil and gas leases;

4. Triple amount of public lands in any one state which one person or a group can hold under oil or gas lease, to double



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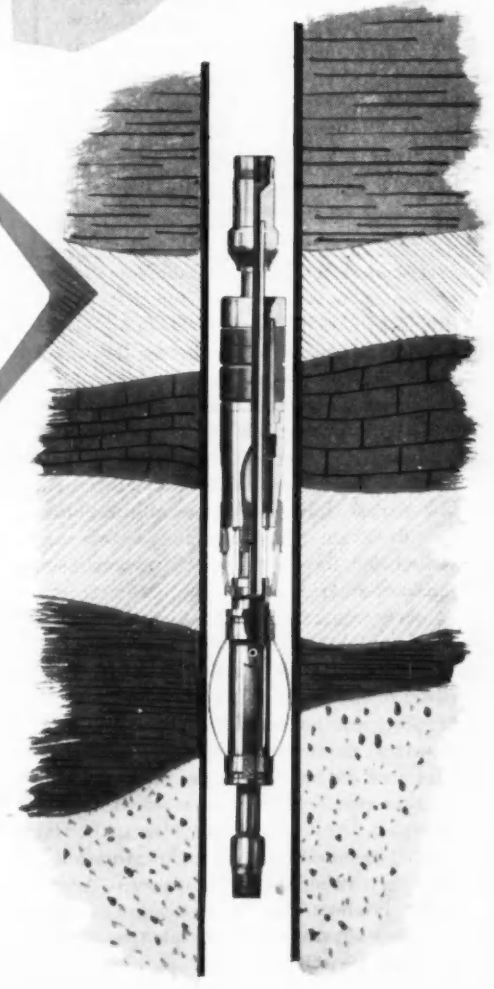

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the amount of land which may be held under option, and to raise the option period from two to three years;

5. Give the Interior secretary more discretion in cancelling leases on non-productive acreage and in determining drainage from federal lands by wells of adjoining drillers.

How Tax Law Affects You

The experts went ferreting into the towering and technical structure of the new tax law last month and fingered out the four provisions of greatest import to the drilling-producing industries.

1. Expensing of intangible drilling costs.

The measure makes it clear that oil and gas producers should be permitted to take tax deductions for their intangible drilling costs. This has been permitted under Internal Revenue regulations, but never before written into law. These costs include drilling, labor, overhead, and virtually all other costs exclusive of pipe, machinery and lease equipment. Importance of this change is that it provides a more assured basis on which the industry can plan operations.

2. Loss carryback.

The old rule provided that net operating losses which could not be used in the current year for tax purposes could be carried back one year or forward five years to offset earnings, thus cutting taxes in those years. The new measure keeps the five-year carry-forward but provides a two-year carryback.

Another liberalizing change will allow individuals who sell business assets to include any loss on that sale in their net operating loss carryover for that year. Corporations have been able to do this, but individuals in business have not. Other changes are aimed at lessening the differences in the tax treatment of firms with fluctuating, and those with stable income.

Most important change in the net loss carryover and carryback provision is that oil and gas producers no longer are required for taxable years after 1953 to adjust or carry back the excess of percentage depletion over cost depletion.

3. Depreciation adjustments.

Under the old law it was usually necessary to depreciate under the so-called straight line method, under which the capital investment is recovered evenly over the expected useful life of the property. The new law will make it possible to compute depreciation under any of various "reasonable" methods. One of these is the declining-balance method, which gives the greatest depreciation allowance in the first year and a gradually smaller amount in each subsequent year. As a result, at the end of the estimated useful life of the asset there remains an undepreciated balance representing salvage value. Another method is the sum-of-the-digits, similar in effect to the declining-balance method except that it results in complete depreciation of an asset at the end of its useful life. It is also permissible to change from one method to the other during the useful life of the asset.

4. Aggregation of mineral interests.

The term "property" for the purpose of computing depletion allowances is now defined. The general rule stated in the old law is that, for the purpose of computing the depletion allowance in the case of wells, the term "property" means each separate interest owned by the taxpayer in each mineral deposit in each separate tract or parcel of land.

The new code permits a taxpayer to elect to aggregate and to treat as one property, for purposes of percentage depletion, cost depletion, and gain or loss upon a sale or exchange, two or more separate *operating* mineral interests which constitute part or all of one operating unit. This applies to working, not bookkeeping, units, and they need not be contiguous. Aggregated interests lose their separate identities, and all other interests *must* be treated as separate properties.

Other important changes were made in regard to:

- Exploration expenditures (other than for drilling of oil and gas wells). The old rule is that a taxpayer may deduct in the current taxable year up to $75,000 of exploration expenses, or may elect to defer these expenses and deduct them proportionately as the minerals are sold. The measure raises the dollar limit to $100,000.
- Research expenses. These may now be deducted in the tax year in which they are incurred. It was previously possible to make such deductions only for research carried out under a permanent program, thus penalizing the smaller companies. The new rules will not apply to exploration expenditures.
- Dividends. The measure eases the burden of double taxation of corporate dividends by providing that taxpayers will be allowed to exclude $50 a year of dividend income received in any taxable year ending after July 31, 1954. The taxpayer will also deduct from the final tax a credit of 4 percent of any dividends, over and above the $50 exclusion, received after August 1, 1954. However, the credit cannot be more than 2 percent of total taxable income in 1954 and 4 percent of taxable income in later years.
- Organization expenses. Corporations will be permitted to write off their organization expenses over a period of five or more years. Presently, these expenses usually can't be deducted until the corporation finally liquidates.

Cannibal Land Search

The search for oil now is leading into the frontiers patrolled by some of the world's last remaining eaters of human flesh.

Frome Broken Hill Company (Anglo-Iranian Oil and Vacuum companies) has scheduled drilling operations under the bed of the Gulf of Papua in the South Pacific. Australian interests are in the exploration party.

During the next five years, about $2.8 million will be spent in geological studies in the 161,000-square-mile concession of tidelands around York peninsula of North Queensland and extending into the Gulf of Carpentaria.

AIOC holds inland concessions on the Papua mainland of New Guinea, where drilling for oil is under way following discovery of natural gas.

And inhabiting the Papuan Gulf shores are some of the world's last cannibals.

FPC Regulation Challenged

Federal Power Commission's new, drastic price-control regulations on natural gas —based on the Supreme Court mandate in the Phillips Petroleum Company case— seemed headed for a quick court referral.

Early last month The Ohio Oil Company and Magnolia Petroleum Company challenged the legality of the regulations and demanded the FPC hold public hearings on them before proceeding with enforcement. Gas industry circles said an FPC denial of the petition was certain and that it was equally certain the companies would appeal to the U. S. Circuit Court of Appeals in Washington, as provided when decrees of Federal regulatory bodies are contested.

The Ohio-Magnolia challenge was followed by petitions lodged by Humble Oil & Refining Company; Gulf Refining Company and Gulf Oil Corporation (together); Kerr-McGee Oil Industries, Inc.; American Producing Company; American Republics Corporation; Houston Oil Company of Texas; Tide Water Associated Oil Company; an individual, George J. Darnelli of California; Union Producing Company; Oil and Gas Property Management, Inc., Houston; Llano Grande Corporation, Houston; Eastern States Petroleum Company, Inc.; and individual Houston gas producers, H. S. Cole, Jr., and Frank W. Michaux.

The Commission had 30 days to accept or reject each petition. It meets regularly once a week but holds special sessions when major problems arise.

Magnolia and Ohio called the regulations illegal because they were issued without prior public hearings and said no formal notice was served on the thousands of independent producers affected. They said this deprived them of their rights,

under contracts already in effect, to rate increases and changes in service without FPC approval.

In substance, this echoed charges made by FPC Commissioner Seaborn L. Digby when he filed a lone dissent to the commission's order. Digby said, in his opinion, the commission had exceeded its rule-making authority "in adopting this ex parte and unilateral order." He said it was a violation of the Natural Gas Act, jeopardized the rate structure of every company selling gas in interstate commerce, raised the spectre of countless lawsuits, and probably was unconstitutional.

A gas industry spokesman said he didn't want to try to "read minds," but he believed the challenge would wind up in the Appeals Court.

He said challenging companies "undoubtedly will exhaust all their remedies before the FPC before going to court" but that it must be kept in mind that the FPC is bound to enforce the Supreme Court mandate as the law of the land and therefore can be expected to deny the petitions.

When the Supreme Court reconvenes in October, it will have before it petitions from Phillips Petroleum Company and the states of Texas, Oklahoma and New Mexico for a rehearing in the Phillips case. Denials are certain unless the weight of accumulated evidence persuades the court that the issue requires another review.

FPC was handed one rebuff by Congress' refusal to appropriate $300,000 requested for additional personnel to administer the Supreme Court order. This lack of funds will delay processing of expected applications which probably will run into the thousands. Consequently, producers having bona fide claims for higher prices will not be able to get the prompt action assured them by the Commission when it froze the price of gas.

Meanwhile, President Eisenhower moved into the case indirectly when he appointed a special cabinet committee to study the nation's oil, gas and coal policies. Russell B. Brown, general counsel of the Independent Petroleum Association of America, said "it appears the study will cover the problem resulting from the new regulation of production of natural gas."

The same interpretation was placed upon it by a spokesman for Sen. Lyndon B. Johnson (D-Texas). After the Supreme Court's Phillips edict, Johnson wrote the President urging appointment of commission to study all ramifications of the decree and make recommendations for corrective legislation.

Eisenhower did not reply to Sen. Johnson directly but the White House said the whole field of energy, rates and consumption would be studied. The Committee must report by December 1, well in advance of convening of the 84th Congress which will receive many bills to overturn the Supreme Court ruling.

Is It Time—Swiss, That Is—to Curb Imports?

A watch may affect Texas Independent Producers and Royalty Owners Association's effort to get government help on imports. TIPRO apparently will press its Tariff Commission appeal on grounds that the domestic industry has been injured to the extent that national defense is threatened. A petition in behalf of its claim is expected to ask that foreign and domestic production costs be equalized.

To support its case, TIPRO is expected to refer to the recent White House approval of the Tariff Commission's recommendation for a 50 percent rise in tariffs put on foreign watches.

But that raises a question: can domestic producers prove an injury claim approaching that suffered by domestic watch makers, whose collective share of the domestic market slipped from 80 percent before World War II to 41 percent last year?

However, Office of Defense Mobilization has reported that an industry's ability to produce intricate mechanisms should be preserved for national defense. Since TIPRO has moved steadily against imports in a stated effort to preserve domestic crude producing ability for national defense, it may be that TIPRO's case will, in turn, be supported by the ODM ruling.

Meanwhile, Independent Petroleum Association of America will not request new Tariff Commission relief on imports. Instead, the group will leave the issue squarely up to the President's Fuels Policy Committee. For now, at least.

IPAA General Counsel Russell Brown said the 1949 IPAA appeal to the Commission—"under observation" since—will not be pushed. Because, says Brown, policy determination by inter-cabinet committee may give the requested relief.

What Benefit Convertibility?

U. S. oil companies and equipment manufacturers will realize little, if any, immediate benefits in greater dollar earnings abroad from the plans of British Commonwealth and several European nations for a limited form of free currency convertibility—something that hasn't existed since the late '30's.

To put it briefly: American oil companies competing in foreign markets long ago converted their operations to local non-dollar, or "soft" currencies.

American oil companies, through the establishment of locally chartered subsidiaries in non-dollar countries, have played an important role in the economic recovery that now makes it possible for these nations to plan for limited currency convertibility. Aid from these oil companies has consisted of steadily increasing purchases of equipment and services in non-dollar areas, a faster than necessary rate of foreign investments—such as refinery construction in Europe . . . and through payment of income taxes to non-dollar nations by locally registered affiliates of American companies.

U. S. companies operating on non-dollar currencies abroad generally have been permitted to repatriate their profits after local taxes in dollars and to obtain enough dollars for essential expenditures—such as Middle East royalties. As long as this practice continues, these companies have no urgent desire to return to a dollar operating basis through currency convertibility. In fact, should U. S. oil companies operating abroad reverse their trend of higher non-dollar expenditures, it could contribute to the defeat of a limited currency convertibility program.

Purchase of materials and services in non-dollar currencies has aided the industrial boom in Europe and has been of particular benefit to British, Dutch and German oil field equipment manufacturers and to American equipment firms that have licensing arrangements or subsidiaries in the non-dollar countries. Regardless of the form of convertibility of currencies that may be established, U. S. oil companies operating abroad will continue, and possibly will increase their purchases of materials and services in non-dollar countries where they operate.

American oil companies have been able to compete in the non-dollar areas due to the need of these nations for petroleum to fuel their industrial recovery in the post-war years, and because of several agreements that were made in 1950 after Great Britain, because of the large dollar drain at the time, unsuccessfully attempted to use only sterling-produced oil in the sterling area. Under the agreements reached, American companies were permitted to make "mixed" sales in sterling and non-sterling countries, taking specified percentages of payments for oil in dollars and non-dollar currencies.

In the sterling area, U. S. company oil sales generally are limited to an amount determined by the sterling expenditures of these companies. The mixed sales plans, however, have generated the necessary

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dollars to meet royalty requirements of Middle East nations and for dollar profits to U. S. companies.

Various proposals for a limited form of currency convertibility which are expected to be discussed at the annual meeting of the International Monetary Fund in September, generally are considered to be important moves towards boosting international trade and the economies of many non-dollar nations whose development and expansion have been handicapped to some extent by foreign exchange shortages. Economic growth in any nation, of course, will in the long run be of substantial benefit to the petroleum industry.

Completely free convertibility of the world's monies will not be possible in the foreseeable future—perhaps never—but the plans under consideration propose a step-by-step removal of some of the present restrictions.

The first moves will have to be taken in Great Britain since its pound sterling is the most important currency in international trade. Following closely will be West Germany, The Netherlands and Belgium. It is then expected that Italy and later—perhaps much later—France would be in a position to join the movement.

The British proposal for limited convertibility would permit non-residents of the sterling area who earn pounds sterling in their current operations to exchange the pounds through the Bank of England for dollars or any other currency. Should this limited action prove successful, it is expected the convertibility privileges later would be extended to residents of the sterling area. In the foreseeable future, however, convertibility would be limited to pounds earned in current operations. Capital account sterling—that accumulated in previous transactions—would not be eligible for conversion.

The degree of freeness of convertibility would vary among the nations, with the strongest financially nations—those that already use a large percentage of dollars in their foreign purchases—having the least restrictions on currency convertibility.

Currency convertibility cannot be achieved without some possible adverse effects. To U. S. oil companies operating abroad, the placing of the pound sterling on a limited convertibility with the dollar would, in effect, make the pound a "hard" currency to many other nations. Under the existing sales agreements of U. S. oil companies in non-sterling, non-dollar areas where a large percentage of the cost must be paid in sterling and the remainder in dollars, these nations may find it difficult to provide the sterling that has been available to them previously.

Also there could be some possibly harmful effects to U. S. domestic oil producers. European and British Commonwealth nations considering the limited form of convertibility are urging a more liberal import policy by the U. S. They argue that any new barriers to trade, such as higher import duties or quota limitations, would cancel any benefits gained from limited convertibility. Specifically, these nations want an agreement from the U. S. that tariffs will be lowered or, at least, not raised.

Also the non-dollar nations want the U. S. and possibly the International Monetary Fund to put up dollars in the form of standby credits to help guarantee the success of convertibility.

OGD Pleading for WOC's

Interior Department's Oil and Gas Division, which was reactivated last May after a three-year interlude, is having trouble finding top calibre executives to complete its planned staff. The agency presently has six technical experts on a salary basis plus one official loaned from the oil industry for a short time and serving without compensation in the agency's top staff positions.

In addition to the division's director, Hugh A. Stewart, the existing salaried staff includes an assistant director for oil and gas operations and four section heads: domestic production, foreign production, gas transmission and distribution, and domestic programming. The refinery specialist on loan is scheduled to return to private industry shortly.

Seven executives are needed urgently by the Oil and Gas Division, of which four probably will have to be officials loaned to the agency from oil companies and to serve without government compensation. These "WOC's," as they are labeled, are needed to fill the posts of assistant director to handle over-all programming, an expert on foreign storage and transportation, a general coordinator for the refinery branch of the agency, and a foreign programming specialist.

Oil and Gas Division hopes to find executives to be placed on a federal salary to serve as head of the remaining unfilled posts: domestic storage and transportation, special refinery products, and rapid tax amortization, liquefied petroleum gas and natural gasoline.

Delay of the Oil and Gas Division in filling its projected top staff with salaried personnel results from the agency's inability to offer salaries commensurate with those received in industry. Recently, the agency shifted its sights on personnel procurement and has attempted without much success to fill its most essential technical posts with temporary officials to be loaned from the petroleum industry. This was the general practice used by Petroleum Administration for War in World War II and, more recently, by Petroleum Administration for Defense, which replaced OGD at the start of the Korean War.

Like PAD during its latter stages of operations, OGD has learned that once the urgency for defense planning has receded, individuals in industry are reluctant to take prolonged leaves of absences from their permanent jobs to serve in Washington. Hundreds of key men were furnished by the oil and gas industries to serve in PAW and later in PAD for terms lasting from a few months to one or more years. To be of real value, a WOC executive is needed in Washington for at least a year and oil companies are unwilling to part with key officials for that length of time.

Oil and Gas Division has been a part of the Interior Department since 1946. It was established after the wartime PAW was abolished as a peacetime agency to aid the government (including military services) and the petroleum and natural gas industries to be prepared for future emergencies as far in advance as possible. Purpose of such planning would be to avoid the serious problems thrust upon government and industry at the start of World War II due to lack of a coordinated emergency program for getting essential petroleum produced, refined into necessary products and transported to areas of utility. The agency is a coordinator between various branches of the federal government, the oil and gas producing states and oil and gas companies.

Oil and Gas Division works through four industry groups—National Petroleum Council, Military Petroleum Advisory Board, Foreign Petroleum Supply Committee and Gas Industry Advisory Council—all of whose members are industry officials appointed by the Secretary of Interior.

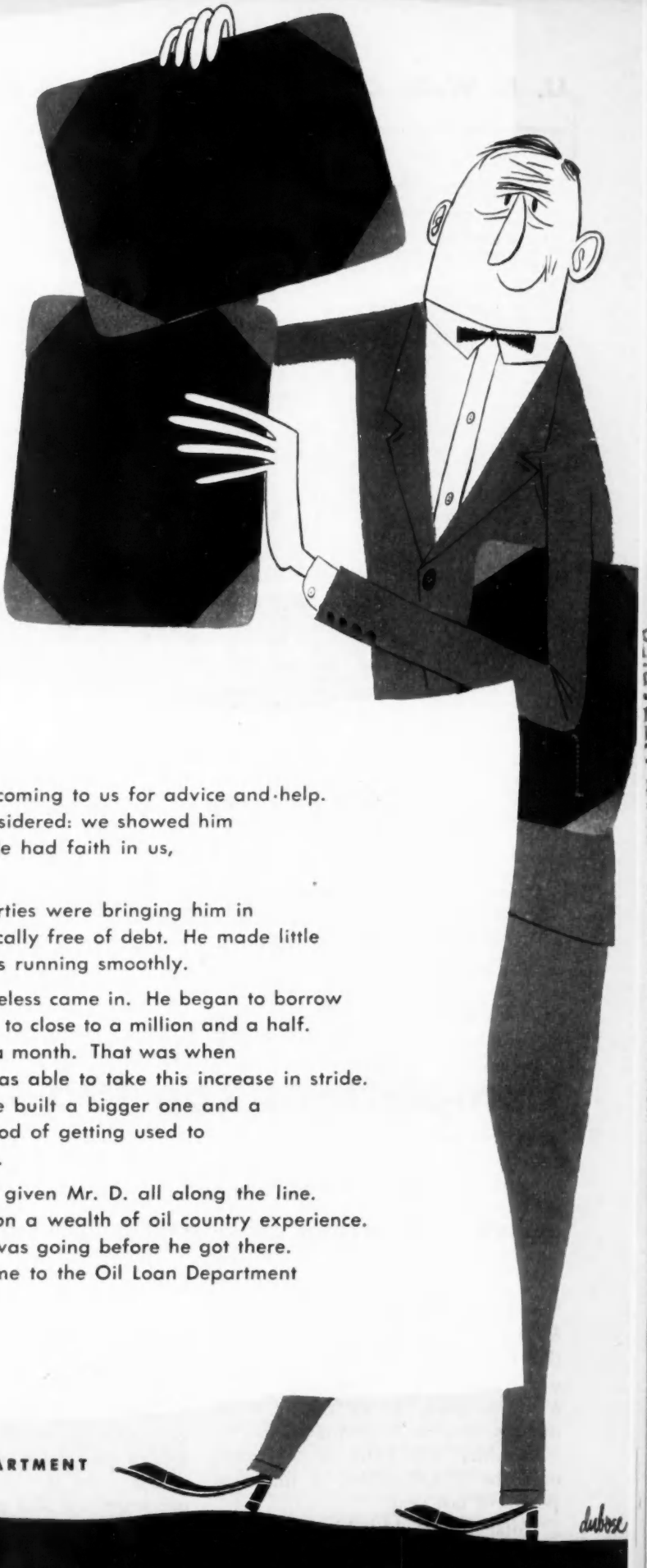
Suppliers to Work with U.S.

To abet the government mobilization work program, a contingent of representatives from many oil field machinery and equipment companies have agreed that the industry will report production statistics to the government.

It is expected that final drafting of the report form, company approval and, finally, government officials' OK will require at least two months.

Meeting with the Business and Defense Services Administration last month, when the reporting agreement was reached, were R. G. Ayres, Bovaird Supply Company, Tulsa; Earl Cobden, Hughes Tool Company, Houston, chairman of the company group at the Washington meeting; J. P. Desalle, Schlumberger Well Surveying Corporation, Houston; Howard Drake, Oil Well Supply Company, Dallas; W. H. Larkin, Larkin Packer Company, St. Louis; George Oller, Parkersburg Rig & Reel Company, Parkersburg, W. Va.; Charles Reichert, National Supply Company, Los Angeles; F. B. Reybold, American Locomotive Company, Beaumont, Texas; H. R. Safford, Petroleum Equipment Suppliers Association, Houston; John L. Tulles, J. B. Beaird Company, Shreveport.

Mr. "D" came for advice



When Mr. D. first got started he began coming to us for advice and help. We helped him in a way that he had not considered: we showed him the need for building a good organization. He had faith in us, and he did build a good operation.

Mr. D. was doing pretty well. His properties were bringing him in around $25,000 a month, and he was practically free of debt. He made little deals all the time, just enough to keep things running smoothly.

Then a wildcat that was considered hopeless came in. He began to borrow to define his field limits, and his debt ran up to close to a million and a half. But his income jumped to around $100,000 a month. That was when Mr. D.'s organization paid off for him. He was able to take this increase in stride. With the nucleus of a strong organization, he built a bigger one and a strong one. Instead of having a difficult period of getting used to bigger operations, he sailed smoothly along.

We are proud of the help that we have given Mr. D. all along the line. We helped him with impartial advice based on a wealth of oil country experience. We helped him because we knew where he was going before he got there. This sort of help is why oil men **going up** come to the Oil Loan Department of The National Bank of Commerce.

E. O. BUCK, VICE PRESIDENT, OIL LOAN DEPARTMENT

THE NATIONAL BANK OF COMMERCE

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U. S. Wells Completed in July and First Seven Months, 1954

STATE or DISTRICT	NEW WELLS COMPLETED AND FOOTAGE DRILLED										DETAILS FOR JANUARY-JULY					Rigs in Operation		
								TOTAL NEW WELLS				New Wells		Footage				
	Oil	Dist.	Gas	Dry	Water Input	Gas Input	Water Disposal	July, 1954	June, 1954	July, 1953	Total Footage July, 1954	1954	1953	Percent Diff.	1954	1953	July 31, 1954	June 31, 1954	July 31, 1953
Alabama				5				5	6	10	30,063	48	59	— 18.7	250,263	298,063	4	7	7
Arizona									6	1		8	6	+ 33.3	30,774	19,960	4	3	3
Arkansas	21			25				46	48	59	161,777	315	265	+ 18.9	1,130,917	951,199	35	30	36
California	129		9	39				177	190	181	900,376	1,451	1,480	— 2.0	6,652,703	6,364,262	201	198	260
Colorado	40		3	69				112	118	74	609,866	742	362	+105.0	4,104,646	1,812,998	62	73	63
Florida				4				4	2	2	24,492	19	20	— 5.0	121,835	113,439	4	3	4
Georgia				4				4			6,940	7	3	+133.3	18,008	7,808		3	3
Idaho										2			4			22,748		1	
Illinois	195			147				342	248	174	843,503	1,730	1,057	+ 63.7	4,621,931	2,636,271	265	258	229
Indiana	24		1	30				55	66	160	91,524	445	745	— 40.3	686,194	1,288,038	126	124	200
Kansas	214		33	170			4	421	342	335	1,504,227	2,449	2,692	— 9.0	8,589,904	9,303,791	411	405	466
Kentucky	47		16	60				123	110	105	218,114	795	636	+ 25.0	1,501,105	1,268,721	85	106	101
Louisiana	178	17	14	80				289	349	224	1,795,149	1,974	1,403	+ 40.7	12,532,570	10,033,314	276	268	248
North Louisiana	121	2	4	27				154	167	97	447,244	1,017	578	+ 76.0	2,980,774	2,162,795	57	53	67
South Louisiana	57	15	10	53				135	182	127	1,347,905	957	805	+ 18.9	9,551,736	7,870,519	219	215	181
Maryland													2			8,198	4	3	3
Michigan	11			27				38	46	61	86,667	318	331	— 4.0	834,924	878,035	101	108	90
Mississippi	7	3	1	22				33	40	44	257,736	226	227	— 0.5	1,605,014	1,578,533	28	40	30
Missouri				2				2		2	962	8	15	— 46.7	9,095	13,402		1	4
Montana	6		1	5				12	36	45	49,742	194	236	— 17.8	754,301	1,088,860	44	30	65
Nebraska	14		4	15				33	45	33	187,909	216	197	+ 10.0	1,205,347	1,028,540	31	23	19
Nevada									6			8	6	+ 33.3	40,095	9,050	2	3	1
New Mexico	88		46	18				152	87	153	777,011	695	851	— 18.3	3,776,365	4,817,991	115	135	196
New York	31				19			50	37	87	68,496	365	517	— 29.4	540,858	722,525	71	80	109
North Dakota	21			12				33	26	20	222,088	156	138	+ 13.0	1,084,825	1,072,996	34	39	27
Ohio	47		32	29				108	82	81	204,737	622	552	+ 12.7	1,208,378	1,141,466	209	186	187
Oklahoma	528	6	24	280	3		1	842	513	565	2,774,623	4,876	4,052	+ 20.3	16,537,518	14,303,888	748	942	601
Pennsylvania	21		18	4	18	5		66	84	145	122,606	636	924	— 31.2	1,121,314	1,603,663	161	184	283
South Dakota				1				1	4	3	7,465	15	8	+ 87.5	86,712	38,256	1	2	7
Texas	933	38	66	657	3	2	2	1,701	1,513	1,442	7,380,312	10,548	9,849	+ 7.1	47,756,132	44,921,327	1,301	1,329	1,299
Dist. 1: South Central	54		4	60				118	79	62	386,063	623	482	+ 29.3	2,118,629	1,555,342	43	37	38
Dist. 2: Middle Gulf	19	6	8	33				66	56	53	418,336	474	454	+ 4.4	2,836,894	2,787,243	45	40	42
Dist. 3: Upper Gulf	79	13	4	71			1	168	148	154	1,080,367	1,023	971	+ 5.4	6,961,832	6,550,005	123	139	136
Dist. 4: Lower Gulf-S.W.	54	12	8	61				135	107	149	661,978	875	1,080	— 19.0	4,513,675	6,228,456	80	79	104
Dist. 5: East Central	8	1		16				25	37	19	93,448	162	181	— 10.5	595,490	719,518	14	17	13
Dist. 6: Northeast	20	4	13	22				59	63	52	323,299	419	289	+ 45.0	2,486,223	1,701,954	53	52	48
Dist. 7-B: North Central	184		3	145	1			333	180	280	1,003,522	1,635	1,822	— 10.3	5,317,650	5,905,733	123	134	138
Dist. 7-C: West Central	55		2	40				97	120	115	521,029	739	820	— 10.0	3,784,426	4,005,518	126	139	120
Dist. 8: West	198	1		50				249	218	196	1,516,362	1,626	1,292	+ 25.9	9,794,823	7,399,160	344	363	339
Dist. 9: North	222	1	3	153	2	2	1	384	414	318	1,143,353	2,410	2,181	+ 10.5	7,480,499	7,221,845	266	232	248
Dist. 10: Panhandle	40		21	6				67	91	44	232,555	562	277	+102.9	1,865,991	846,553	84	97	73
Utah	1		1	4				6	6	8	23,841	30	50	— 40.0	144,927	290,097	22	22	17
Washington																	1	1	1
West Virginia	2		45	10				57	44	49	188,696	303	354	— 14.4	872,472	994,859	172	160	204
Wyoming	55	1		24				80	117	87	470,115	723	415	+ 74.2	3,822,823	2,102,098	98	89	115
Total United States	2,613	65	314	1,743	43	7	7	4,792	4,171	4,152	19,009,037	29,922	27,456	+ 9.0	121,641,890	110,734,396	4,616	4,656	4,878
Total Western Canada	138		8	77				223	124	278	789,713	1,128	1,211	— 6.9	4,521,772	5,021,438	176	137	179

Completions Top 1953 Peak

New wells amount to 29,922 at end of seven months, or 9 percent above total in last year's period.

WELLS COMPLETED during July totaled 4792 for a new monthly high this year and boosted the year's record into a substantial lead over 1953's all-time peak. At the end of seven months, new wells amounted to 29,922, which was 2466 or 9 percent over the 27,456 drilled in the same period of last year.

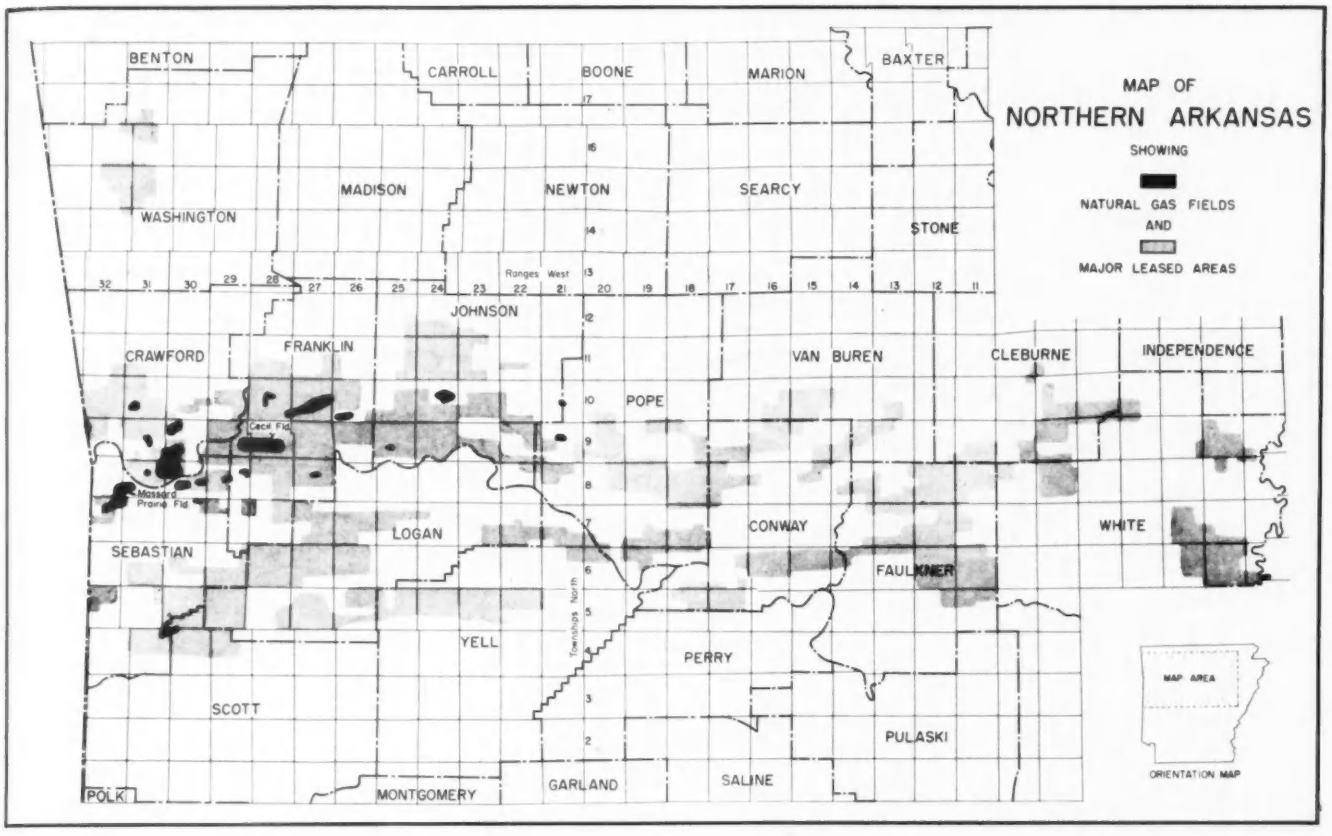
Total footage drilled in July's wells amounted to 19,009,037 feet, which was also high for the year. That record footage hiked the year's seven-month total to 121,641,890 feet, which was almost 10 percent more than the 110,734,396 drilled in the comparable period of 1953.

Contributing a large share of the gain was Texas. Wells drilled there totaled 10,548 for an increase of 7.1 percent over last year's. Texas alone accounted for 35.3 percent of the nation's total wells so far this year.

An even greater gain was recorded in Oklahoma, No. 2 area, where 4876 new wells represented an increase of 824 wells, or 20.3 percent. The No. 3 drilling state, Kansas, was the only one of the top five that experienced a drilling drop this year. Wells there declined 243 to 2449 for a decrease of 9 percent.

Among the leaders, Louisiana's performance was the most spectacular this year. Louisiana's drillers completed 1974 new wells, representing a hike of 40.7 percent over last year's 1403. The largest part of the state's increase occurred in the northern part, although the southern half also saw stepped-up activity. Despite the increase, Louisiana still occupies the No. 4 drilling spot in the nation.

There seems little chance that the July rate of completing wells will hold through August. For the second straight month the number of U. S. active drilling rigs dropped slightly. However, the outlook for a new record in wells this year is still good.



Oil and More Gas Promised In Northern Arkansas

Northern half of state includes four geologic units . . . 1. Ozark Platform has shallow gas. 2. Arkansas Valley scene of leasing and wildcatting. 3. Ouachita mountains largely undrilled. 4. Mississippi Embayment has oil possibilities.

By B. J. SCULL, Geologist,
Arkansas Resources and Development Commission, Little Rock

NATURAL GAS has been produced in the Arkansas Valley area in commercial quantities since 1902, but completion of an eight-million-cubic-foot-per-day well in the Hale formation (Morrow) several years ago sparked an intensive leasing and development campaign which, strange to say, has escaped the attention which its importance merits.

Natural gas was first discovered in the Mansfield field in 1902. Sporadic exploration from 1902 to 1949 developed about 25 gas fields in the Valley area. Only five of these produced over 20,000 mmcf of gas. The total production of natural gas in the Arkansas Valley from 1902 to 1949 was about 200,000 Mmcf from about 29,000 developed acres. All of these fields produce from sands of the Atoka formation, and nearly all of them produce from two or more sands.

Part 1

In 1949 the Arkansas-Louisiana and Arkansas-Oklahoma gas companies drilled the Ark.-La. Barton 1 in Sect. 27-9n-28w, as the discovery well of the Cecil field, to become the first well in northern Arkansas to yield commercial gas in any formation other than the Atoka. It was drilled to the Everton formation (Ordovician) and plugged back and completed in the Hale formation (Morrow).

Since then the gas companies operating in the valley area have discovered five new fields and extended some of the older fields. Most of the drilling activity has been confined to the western part of the valley. This activity has increased the known natural gas reserves from about 125,000 mmcf to over 220,000 mmcf. Cumulative production to 1954 was 236,084 mmcf.

The discovery of commercial amounts of natural gas below the Atoka touched off a leasing campaign by several major oil companies. Nearly one million acres are now under lease in the Arkansas Valley and in the adjoining portion of the Mississippi Embayment. The larger blocks are held by The Carter Oil Company, Continental Oil Company, Gulf Oil

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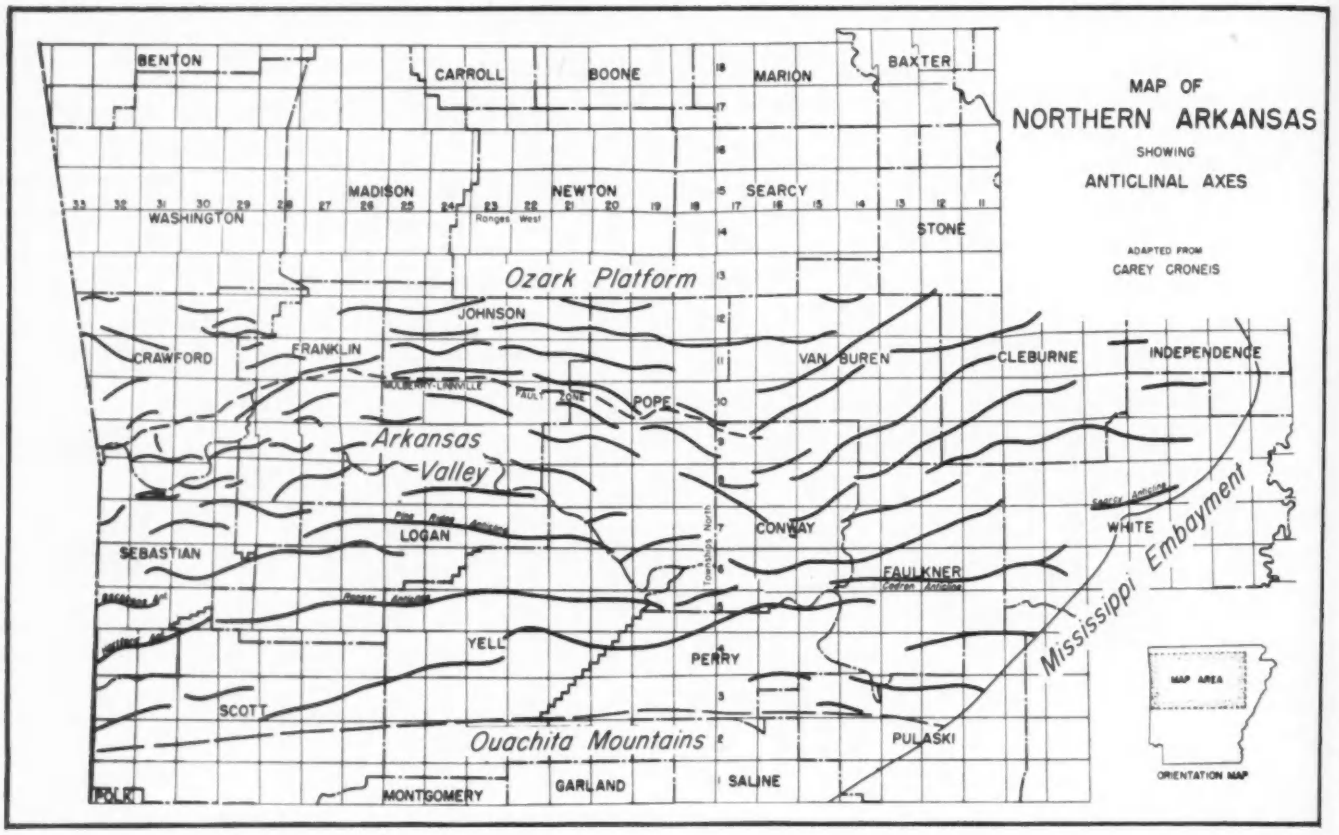

Corporation, Magnolia Petroleum Company, and C. H. Murphy, Jr. Most of the leases are located on structures described by Croneis in Arkansas Geological Survey Bulletin 3.

Geological Setting. The north half of Arkansas is divided into four geologic units: the Ozark Platform, the Arkansas Valley, the Ouachita Mountains, and the Mississippi Embayment.

The Ozark Platform is separated from the Arkansas Valley by a major fault system which the writer calls the Mulberry-Linnville fault zone. There is not sufficient structural or stratigraphic criteria to clearly separate the Arkansas Valley and the Ouachita Mountains. However, on the basis of geomorphology, the writer places the southern limit of the Arkansas Valley along the southern limbs of the Fourche La Fave and the Big Rock synclines in Townships 2 and 3N. The embayment is separated from the other units by a major unconformity and by structural and lithologic differences.

The Ozark Platform—The Ozark Platform has been subjected to mild to intense intermittent uplift since early Ordovician time. Local unconformities are very abundant throughout the section. Four major unconformities are present in the pre-Pennsylvanian section; pre-Everton, pre-Penters, pre-Sylamore, and pre-Boone. Local folding and faulting preceded or accompanied the truncation associated with each of these major unconformities. Many of the fold axes were subject to repeated movements.

Folding in the Chester and Pennsylvanian beds is not as pronounced as in the older beds. Local folds and domes with 50 to 200 feet of closure are present along the southern part of the platform. The platform in northwest Arkansas dips southward about 35 feet per mile. Elongate east-northeast trending structural terraces interrupt the south dip. Low north dips afford local closure on many of the terraces.

The Ozark region has been uplifted 1500-2500 feet in at least three stages since early Cherokee time. This is shown by two levels of dissected peneplains and the present elevation of the region as compared to the adjoining units.

The pre-Chester sediments of the Ozarks are predominantly calcareous, but well developed sandstones and black shales are present in the section. Chester and Morrow sediments are predominantly black shale with some well developed limestones and sandstones. The Atoka is mostly black shale with lenticular to semi-persistent sandstone beds. The sandstone becomes better developed to the east.

POTENTIAL SOURCE BEDS:

Everton ls—Ord.—Fossiliferous ls
Chattanooga sh—L. Miss.—Carbonaceous
Moorefield sh—L. Miss.—Carbonaceous and Bituminous
Hindsville ls—L. Miss.—Very Fossiliferous
Fayetteville sh.—Miss.—Carbonaceous and Bituminous
Bloyd sh—Basal Penn.—Carbonaceous and Bituminous
Atoka sh—L. Penn.—Carbonaceous and Bituminous

POTENTIAL PRODUCING BEDS:

Sandstone members of Everton: F to MC, Mostly M, rounded, s/frosting: 20% + porosity on outcrop.

St. Peter ss: Ord.: 10-175 ft. thick: F to MC, Mostly M, rounded, s/frosting, 20%, porosity on out-

crop, 6 to 30% porosity subsurface (reported).

Fernvale ls: U. Ord: 0-125 ft. thick: F to C xln: Weathered or eroded surface below younger beds.

Sylamore ss: Basal Miss.: 2-75 ft. thick: porous and friable on outcrop: Yields gas in Watalula field.

Boone Fmtn: Miss.: 60-400 ft. thick: Cherty crinoidal ls, oolitic members: solution porosity. Yields gas near Fayetteville.

Batesville ss: Miss.: 1-225 ft. thick: F to C, Mostly M, slightly to very calcareous: Bk. shale and/or fetid ls. above and below—oil seeps on outcrop.

Wedington ss: member of Fayetteville sh: 0-150 ft. thick: porous, cross-bedded, and fine grained on outcrop: Porous to calcareous and tight in subsurface—Yields gas in Lone Elm field.

Hale Fmtn: Basal Penn.: 10-300 ft. thick: Mostly an irregular grained calcareous ss, changing to ls. or cong. locally: yields dry gas in Cecil Field: lt. gn. oil seep SE of Huntsville and several asphaltic seeps and sands along northern outcrop. Yields gas in Low Gap area.

Atoka Fmtn: L. Penn.: 0-4000+ ft. thick: Several gas fields in locally persistent sands: Asphaltic seeps and sands in basal ss member along northern outcrop.

The Arkansas Valley—The Arkansas Valley forms a tectonic and stratigraphic unit with the McAlester Basin. This unit is usually called the Arkansas Coal Basin. The Coal Basin is a synclinorium formed during the later stages of orogenic destruction of a geosynclinal trough or foredeep that existed to the south from Early Mississippian to Middle Pennsylvanian.

During the pre-Pennsylvanian the north half of the Arkansas Valley was subjected to the same intermittent uplift that affected the Ozark Platform, although there was less deformation and truncation.

By the end of Morrow time the subsidence and northward migration of the Ouachita trough squeezed the

				OZARK SECTION	OUACHITA SECTION
PENNSYLVANIAN	MIDDLE	DES MOINES	ATOKA	Atoka Formation	Atoka
	LOWER	MORROW	SPRINGER	Bloyd Formation Hale Formation	Jackfork Sandstone
MISSISSIPPIAN	UPPER	CHESTER		Pitkin Limestone Fayetteville Shale Batesville Sandstone	Upper Stanley Shale Middle Stanley Shale
		MERAMEC		Ruddell Shale Moorefield Formation	Lower Stanley Shale Hot Springs Sandstone
	LOWER	OSAGE		Boone Limestone	Upper Arkansas Novaculite
		KINDERHOOK		Chattanooga Shale Sylamore Sandstone	Upper-mid Ark Novaculite
DEVONIAN	UPPER				Lower-mid Ark Novaculite
	MIDDLE			Clifty Limestone	
	LOWER			Penters Chert	Lower Arkansas Novaculite
SILURIAN	UPPER				Missouri Mountain Shale
	MIDDLE			Lafferty Limestone St. Clair Limestone	
	LOWER			Brassfield Limestone	Blaylock Sandstone
ORDOVICIAN			RICHMOND	Cason Shale Fernvale Limestone Kimmswick Limestone	Polk Creek Shale
			TRENTON		Big Fork Chert
			BLACK RIVER	Plattin Formation "Joachim" Dolomite St. Peter Sandstone	Womble Shale Blakely Sandstone
		CHAZY		Everton Formation	Mazarn Shale
		BEEKMANTOWN		Powell Dolomite Cotter Dolomite Jefferson City Dolomite	Crystal Mountain Sandstone
		GASCONADA		Roubidoux Dolomite Gasconade Dolomite Van Buren Dolomite	
CAMBRIAN	UPPER			Proctor Dolomite Eminence Dolomite Potosi Dolomite Derby-Doe Run Dolomite Davis Dolomite Bonneterre Formation La Motte Sandstone	Collier Shale

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rocks to the north against the Ozark Platform and by Middle Atoka time some anticlinal wrinkles were pronounced enough to affect sedimentation. In the southern part of the valley many of the Upper Middle and Upper Atoka sands were deposited only in the synclinal areas and along the flanks of the anticlines.

The hinge line of the Ouachita trough moved northward until late Cherokee time. The anticlinal pattern set up during the Morrow became fully developed. The orogeny that destroyed the trough emphasized folding in the valley and caused some faulting and overturning. Much of the force was dissipated in the thick shale sections. The down-warping of the valley and the development of tensional faults along the north and south margins probably occurred late in the Pennsylvanian.

A line of major structural change is marked by the faulted Backbone anticline, 6-6n-32w to 6-6n-30w; the faulted and locally overturned Pine Ridge anticline, 25-7n-28w to 3-6n-20w; and the asymmetrical Cadron anticline, 36-6n-15w to 33-7n-9w. North of this line the folds are generally open and have dips of 20 degrees or less on their flanks. Asymmetry is shown by steeper south flanks in a few folds. South of this line the anticlines and most synclines have dips of 50 degrees or more on their flanks, and, characteristically, have steeper north flanks.

A second zone of structural change is indicated by an exposure on the Ranger anticline at Blue Mountain Dam in section 15-5n-25w. The Atoka rests with angular unconformity on a faulted siltstone sequence that may represent the Upper Stanley.

In the few fields where subsurface control is available there is considerable axial shift to the south with depth in the Atoka and Morrow beds. There is no control for the pre-Morrow beds.

The pre-Atoka section in the Arkansas Valley is much the same as in the Ozarks; however, facies changes eastward prevent exact correlations with the meager data available.

The Atoka thins irregularly by nondeposition and overlap from over 14,000 feet in the frontal Ouachitas to 2000 feet in the southern Ozarks. Subdivisions of the Atoka cannot be established until much more surface and subsurface data on sand zones and marine (fossil bearing) and non-marine (coal bearing) facies are available.

About the Author

B. J. SCULL graduated with a B.S. degree in geology from the University of Oklahoma in 1946 and gained his M.S. degree in the same subject the following year. From September 1947 to January 1949 he was a Teaching Fellow at Stanford University and from February 1949 to June 1951 was instructor at the University of Nevada. In July 1951 he joined Continental Oil Company and was stationed at Ardmore, Okla., being transferred to the Arkansas Valley area in January 1952 and remained there until August 1953. Shortly afterwards he joined the Arkansas Geological Survey at Little Rock, Ark.

The thickness of the Atoka in the frontal Ouachitas and in the southern part of the valley probably was increased by orogenic squeezing. Squeezing was not intense enough to cause metamorphism. Mica flakes in the shales do not show distortion or growth lines. The quartzitic nature of many of the sands is of secondary origin.

Ouachita Mountains—The Ouachita Mountains are essentially an anticlinorium. During Mississippian and Early Pennsylvanian time the area of the present Ouachita Mountains was a geosyncline. The Mississippian and Pennsylvanian sediments deposited in this geosyncline have a total thickness of over 20,000 feet. During the early Mississippian there was vulcanism associated with the geosyncline. The geosyncline moved northward throughout its history until it was destroyed by orogenic forces. The vulcanism and migration suggest the geosyncline was associated with an island arc type of history. However, the accumulation of sedimentary debris kept pace with or exceeded the amount of downfolding during most of the history of the geosyncline. Consequently, marine strata, other than the lower Stanley, make up only a very small part of the Mississippian-Pennsylvanian section.

The recent discovery of a limestone bed 18 or more feet thick south of Forked Mountain near the Saline-Perry County line in Sect. 32-3n-19w shows there are more marine sediments in the frontal Ouachitas than previously supposed. The limestone occurs near the base of mapped Atoka. It may be Morrow (Wapanucka) or older.

The present structure and outcrop patterns in the Ouachita Mountains in Arkansas indicate that most of the movement during their formation was vertical to slightly overturned northward. The large thrust plates that characterize the frontal Ouachitas in Oklahoma are not known in the Arkansas section. High angle reverse faults and minor thrusts typify the faulting in the Arkansas Ouachitas. The pre-Stanley section of the Ouachitas is predominantly clastic indicating that the Ouachita area was mobile throughout most of the Paleozoic time.

Although present information gives little hope for finding production in the Ouachita type sediments, several wells in the Ouachita section of Oklahoma have had shows of oil. Also Cretaceous shales derived from the Ouachita area have yielded petroleum on analysis.

The Mississippi Embayment—The Embayment area in northeastern Arkansas consists of a portion of the west flank of a downwarped trough. The axis of the trough roughly parallels the present course of the Mississippi River. Upper Cretaceous and Tertiary sediments deposited in a sequence of advancing and retreating seas with attendant unconformities, facies changes and basal conglomerates seem to offer a suitable area for petroleum prospecting. However, the drilling in the area to date has failed to find a favorable show of oil or gas. The Paleozoic rocks below the floor of the embayment are a possible target for petroleum prospecting; however, little is known about the structure of the Paleozoic rocks. Stratigraphically, the Paleozoics are a continuation of the Ozark section.

—End Part 1

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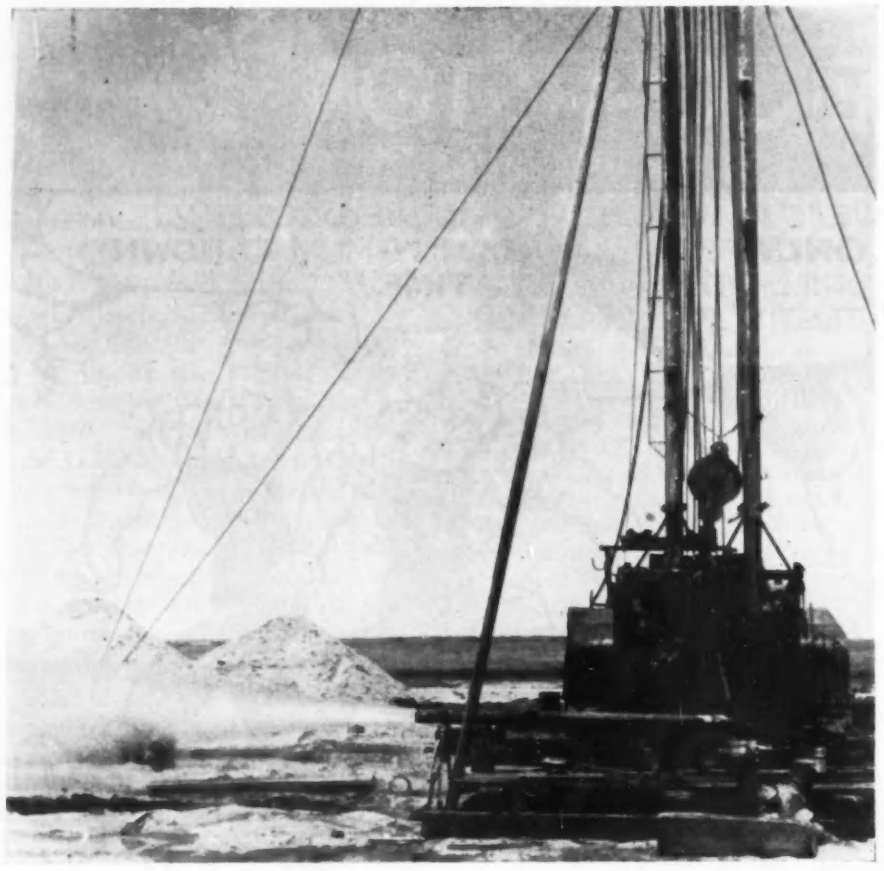

BLOWING OFF ACID WATER after acidizing the producing formation in a gas well in the Greenwood gas field, Morton County, Kansas. Wells are treated with 20,000 to 30,000 gallons of acid.

Greenwood Gas Pool Adds To Reserves in Kansas

This field west of Hugoton near the Colorado line has an indicated productive area of more than 200 square miles. Accumulation apparently occurs in some type of stratigraphic trap.

By WILLIAM F. ABSHER, Geologist
Cities Service Oil Company, Bartlesville, Okla.

THE DISCOVERY of the Greenwood gas pool in Morton County adds a sizable volume to the total proven gas reserves of southwest Kansas. Somewhat overshadowed by the nearby sprawling Hugoton gas pool, the Greenwood development spreads 12 miles east to west and 18 miles north to south.

Production has been established from Morrow (Keyes) basal Pennsylvanian sandstone, and Virgil-Missouri (Topeka, Toronto and Lansing-Kansas City) upper Pennsylvanian limestones. The lower Pennsylvanian Morrow (Keyes) sandstone, the original pay, has not yet been tested sufficiently to determine its potentialities.

The total area of the field has not been established but development indicates that perhaps the upper Pennsylvanian pay will cover more than 200 square miles. The discovery of this pay also opens up a vast area with prospects for production, if similar or other favorable conditions for accumulation can be found.

History. The gas pool was discovered by and named for Cities Service Oil Company's 1 "B" Greenwood in the NE NW of Sect. 14-T33S-R42W. The Greenwood "B" was originally drilled to 6004 feet, some 50 feet into the Arbuckle limestone, plugged back and completed in June, 1951, for 1360 thousand cubic feet of gas through perforations from 4872-4880 feet opposite the Morrow (Keyes) sandstone. It was later perforated from 4854-4872 feet and 4796-4804 feet, opposite additional Morrow sand and recompleted for an open flow of 7800 Mcf gauged after 72-hour SIP., built-up of 1032.5 pounds and a 20-minute blow-down through 2-inch tubing. The west and south offsets were completed from the same sand. The north offset, Cities Service Oil Company's Boehm 1, ran low and the electrical log indicated water saturation in the sand.

Electrical logs of previously drilled wells in the area had indicated possible gas pay in the upper Pennsylvanian limestones. However, no production tests of them had been made. While Boehm 1 was drilling through these limestones, drill stem tests were made where an electrical analyzer detected gas in the cuttings and in the circulating mud.

The results of these tests and the evaluation of the electrical log justified running casing and production testing the prospective limestone pay. The Boehm 1 was completed November, 1952, for 15,800 Mcf open flow after acid treatment through perforations from 3150-3158 feet; 3100-3110 feet; 3112-3118 feet and 2988-

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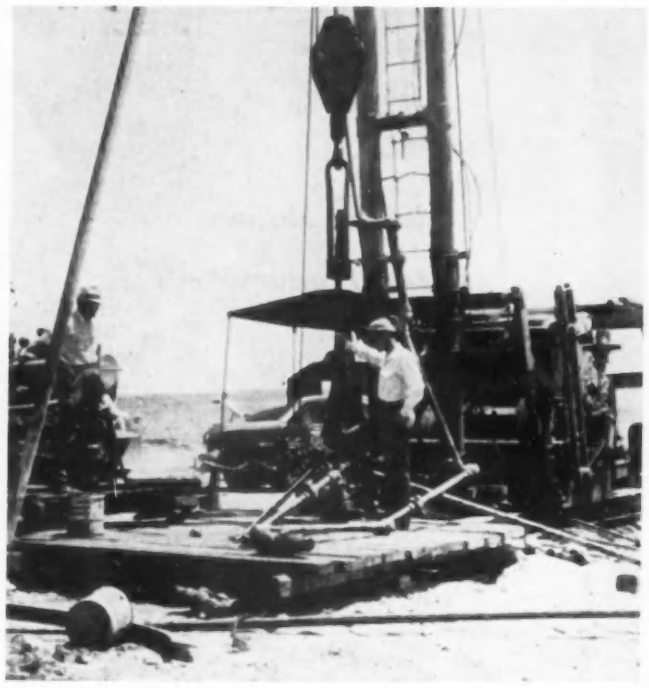
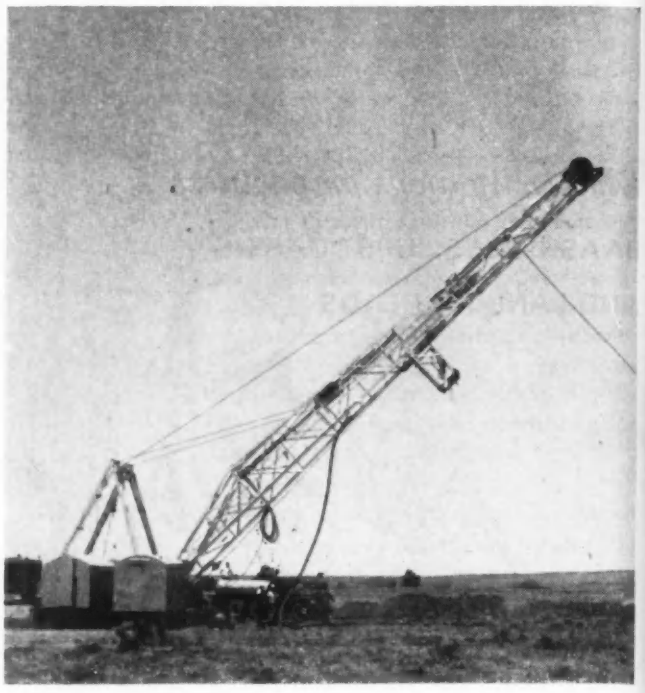


SQUEEZE JOB at a Greenwood gas well. This practice is necessary where water is found with gas opposite any group of perforations and has not been eliminated.



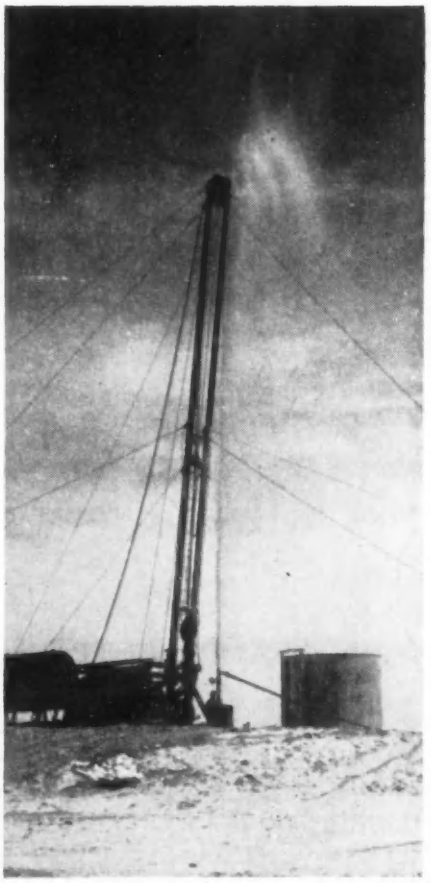
WITH DRILL-STEM penetrating the Lansing-Kansas City limestone at about 3300 feet, rotary drilling equipment is moved to another location while cable tools are rigged up for completion. This practice is followed in Greenwood gas field.

2998 feet to open a new pool in the field and a new pay for southwest Kansas. The new pay has been, so far, the most prolific pay in the field.

Up to August 1, 1954, 61 wells had been completed from this pay for a total open flow of 1,225.5 million cubic feet or a per-well average of more than 20,400 Mcf. Eleven wells that have been tested in this pay have been abandoned. Three wells, other than the discovery that were failures in the Morrow sandstone have been completed for producers from the upper pay. Only four wells of the 14 drilled to the Morrow sandstone, including the Greenwood 1 "B" discovery well, have been sucessfully completed for producers. Their total open flow is only 30,200 Mcf.

Development was rapid during 1953 due to expiring leases and is continuing at a moderate rate through 1954.

Geology. The Greenwood field lies on the southwest flank of the Hugoton Embayment of the Anadarko Basin. The stratigraphy and general geology of the region has been described by John C. Maher and Jack B. Collins of the U. S. Geological Survey in: "Oil and Gas Investigations Map OM 135." Locally, the accumulation of gas seems to be in some type of stratigraphic trap. Examination of drill cuttings and one core of the entire pay section suggests that the pay streaks are in biohermal (reef) type limestone beds deposited near shore. They have three types of porosity—intergranular, vuggy and fracture.



CABLE TOOL EQUIPMENT rigged up, ready for completion of a new gas well in the Greenwood field.

The location for Cities Service Oil Company's Greenwood 1 "B," the discovery well, was made following a seismic survey. The three offsets and other wells that have been drilled to the Mississippian lime have established only north component to the regional east dip. The upper Pennsylvanian beds, so far as development has gone, shows only regional east dip with abnormal steepening on the east edge of production. There is a range of 400 feet plus between the higher producers on the west side and the lowest producer on the east side. Some variation in the rate of dip from well to well is present but the dip does not vary greatly from an average of 30 feet per mile, except on the east side where it is as steep as 190 feet in one mile.

Water has been found on both the high and the low sides of the upper Pennsylvanian gas accumulation. A similar condition exists on the high and low sides of the enormous Hugoton gas accumulation in beds of Permian age. The rock pressures of both the lower Pennsylvanian Mor-

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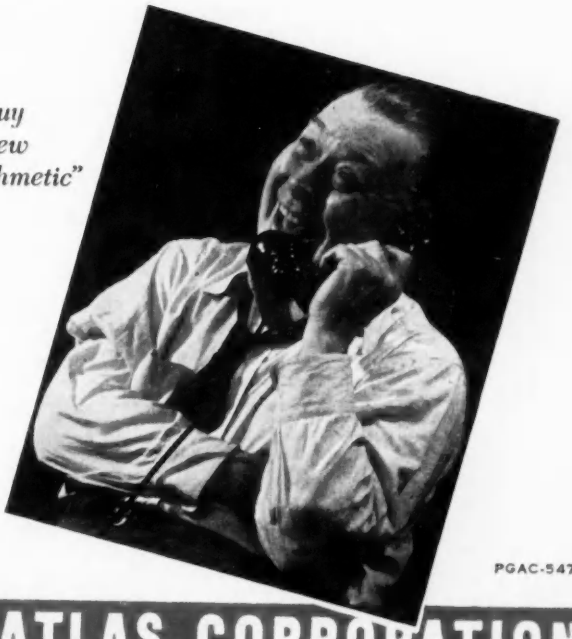

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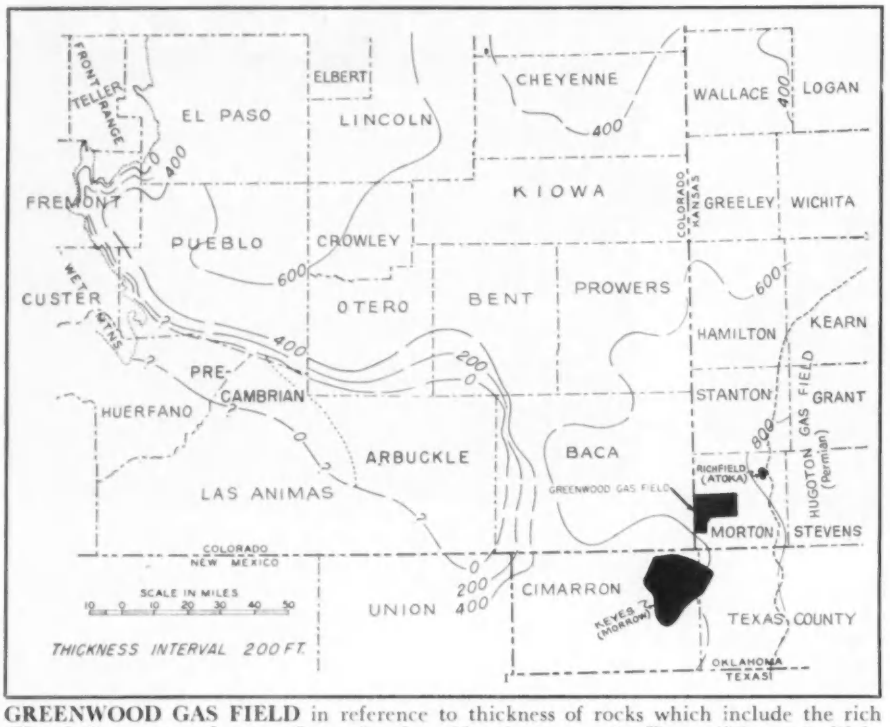
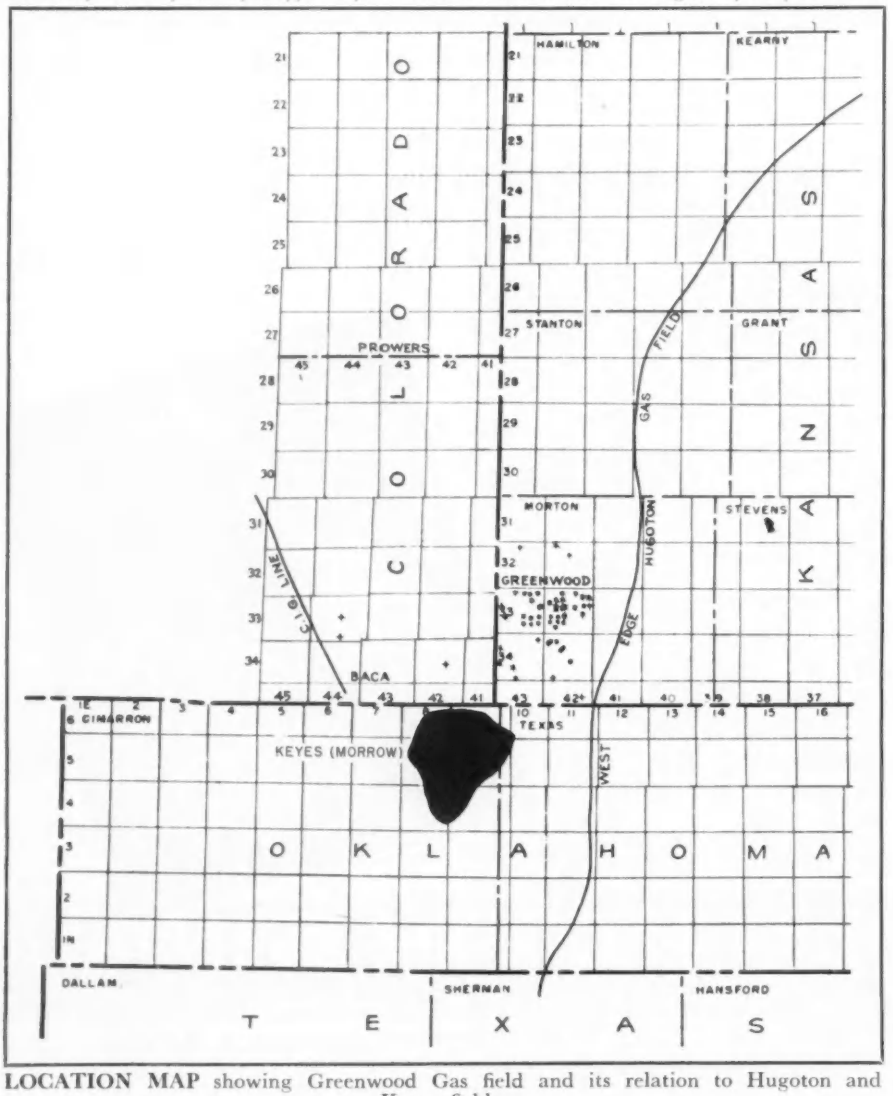


GREENWOOD GAS FIELD in reference to thickness of rocks which include the rich "Topeka" payzone of upper Pennsylvanian. Also shown are the Keyes (Morrow), Richfield (Atoka), and Hugoton (Permian) gas fields. (Adapted from J. C. Maher, AAPG Bulletin, Vol. 37, No. 5, May, 1953, and USGS Oil and Gas Investigation, May OM-135.



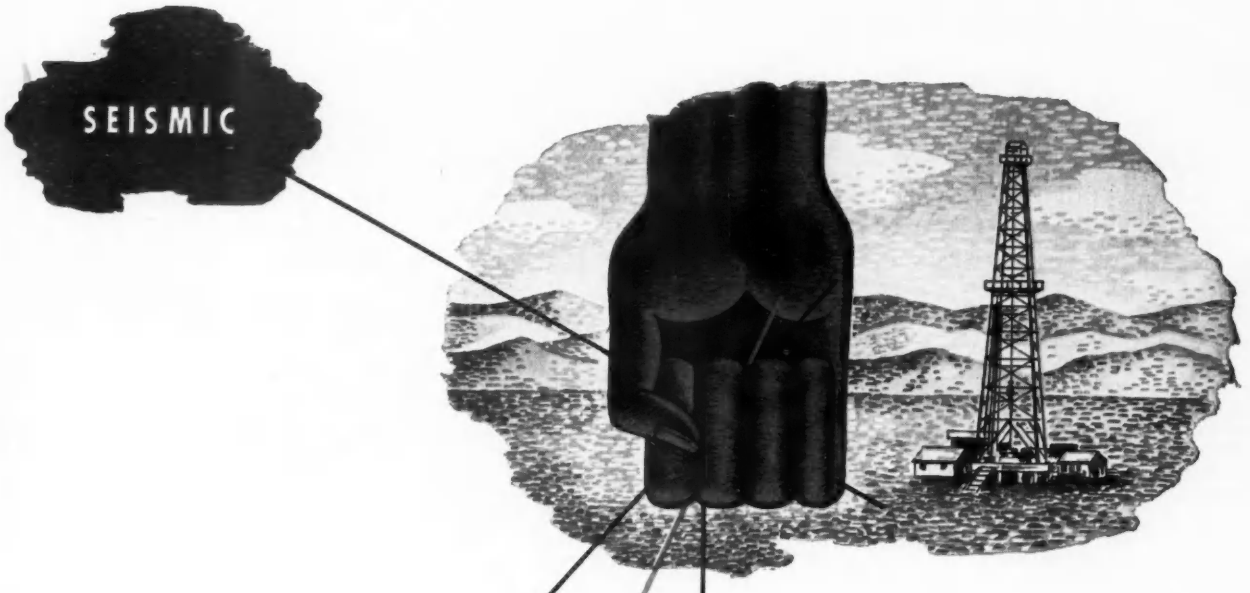
LOCATION MAP showing Greenwood Gas field and its relation to Hugoton and Keyes fields.

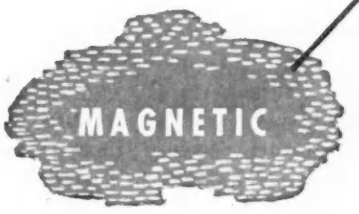
row sand and the upper Pennsylvanian pay of the Greenwood field, like that of the Permian pay of the Hugoton and Texas Panhandle fields, are subnormal for their depth. The writer does not offer an explanation of these anomalous conditions other than to suggest that they may be the results of regional tilting, great enough to reverse the original dips existing at the time of the gas accumulation, thus trapping the water on the now high side, and also at the same time lowering the hydrostatic head of the fluid intake at the outcrop of the producing beds, thus lowering the rock pressure.

Production Practices. Wherever practical, drilling by Cities Service has been done on 640-acre units, with locations near the center of survey sections. Where there has been divided ownership, drilling has been a joint venture.

The general practice, for upper pay production, has been to drill to near the base of the Kansas City limestones, at approximately 3300 feet, cement 5½-inch flow string through the prospective pay with rotary tools, then to move in cable tools for completion. The rotary time, including three days for running 500 to 600 feet of 8¼-inch surface casing and waiting for cement to set, averages about 10 days. There is a "lost circulation" hazard that requires some mud engineering, and that may extend the rotary rig time. The cable tool time for completing averages about 15 days. A poor cement job or perforating into water necessitates squeeze jobs that materially extend the completion time.

The usual completion practice is to separate the prospective pay streaks into three or four groups, perforate and acidize each group separately starting with the bottom group. When the lower group has been tested, a drillable plug is placed above it, and then the next group above is tested. When all groups have been tested and the plugs drilled, a wash treatment of weak acid is given all pay streaks together, before final completion. The total footage perforated ranges from 75 to 130 feet. Where water is found with the gas opposite any group of perforations it has not been successfully eliminated without "squeezing" the entire group. The porosity of the pay streaks ex-





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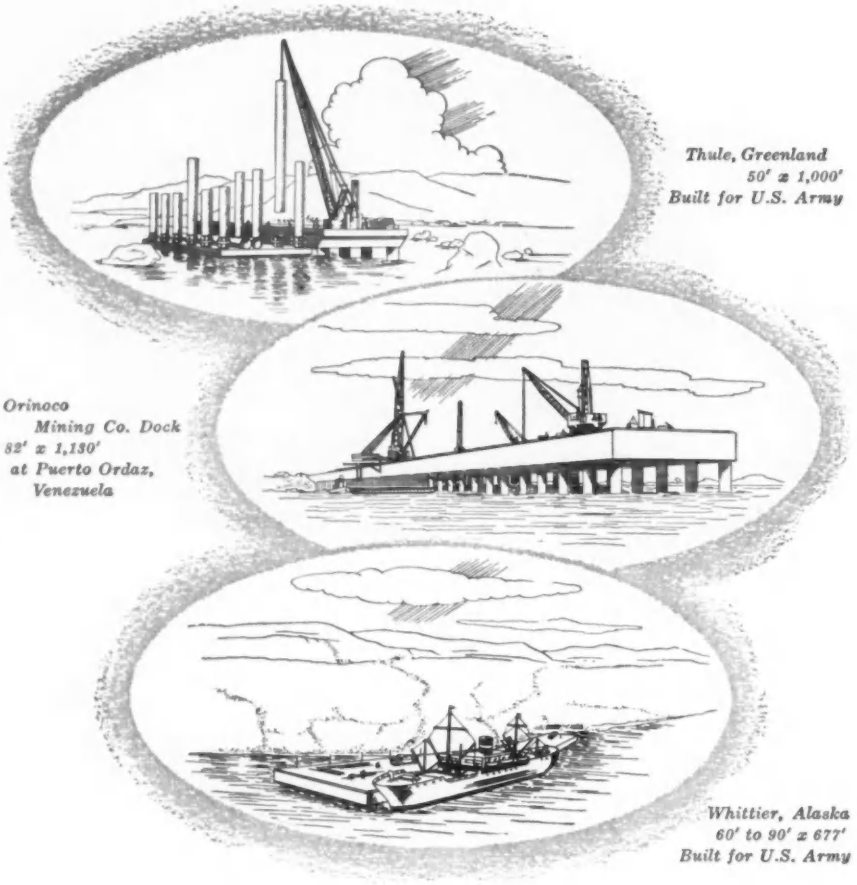

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About the Author

WILLIAM F. ABSHER received his B.A. degree with a major in geology from the University of Oklahoma in 1920. He worked for a small independent for three years following graduation and then joined the Cities Service organization. His professional work has been largely in Oklahoma, Texas Panhandle, and southwest Kansas. He is listed as one of the founders of the American Association of Petroleum Geologists.

posed by the perforations ranges from 7 to 26 percent. The weighted average porosity of cores opposite all 89 feet of perforations in one well was 15 percent. A total of 20,000 to 30,000 gallons of acid is used for the entire pay.

Markets. At present, the field is producing approximately 60,000,000 cubic feet of gas daily, with Colorado Interstate Gas Company and Natural Gas Pipe Line Company of America furnishing the pipe line outlets for the field. —**The End**

ERRATUM

In WORLD OIL August 1, 1954, Page 108, Column 3, line 14 should have read "the range of 10 to 20 micro roentgen." This correction is in the article, "Gamma Ray Exploration Comes of Age," by David S. Lobdell, E. F. Buckley, and Dr. John W. Merritt. The sentence containing the erroneous line is hereby corrected to read: "Most of our measurements have been in the range of 10 to 20 micro roentgen per hour."

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We never dreamed... that the oil industry would respond so enthusiastically to our introduction of the "Royal Scintillator." We were caught with our production down. We not only did not have enough instruments to supply the demand, we didn't even have enough catalogs. We apologize and wish to assure our customers that we are now in a position to give prompt service.

Not everyone agrees that the radiation survey technique is a proven method of oil field exploration. We agree that not enough data is available as yet, however, there is a growing body of opinion which holds that this is a valuable technique. Recent very encouraging results support this opinion.

We cannot guarantee that the Model 118 Royal Scintillator will locate oil, but we can guarantee that the Royal is the best instrument made for investigating the radiation pattern existing around oil fields. It is also the best instrument made for uranium prospecting, and its use for this purpose should not be overlooked by oil geologists.

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PRECISION RADIATION INSTRUMENTS, INC.

World's Largest Manufacturers of Portable Radiation Instruments

Exploratory Drilling . . . in July and First Seven Months 1954-1953

State or District	MONTH OF JULY, 1954													FIRST SEVEN MONTHS, 1954																
	Productive Tests									Total Productive	Unproductive Tests			Total Exploratory Tests	Productive Tests								Total Productive	Unproductive Tests			Total Dry		Total Exploratory Tests	
	New Fields			New Pays			Extensions								New Fields			New Pays			Extensions									
	Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas		Wildcats	New Pays	Outposts		Oil	Dis.	Gas	Oil	Dis.	Gas	Oil	Dis.	Gas	7 Mo. 1954	7 Mo. 1953	Wildcats	New Pays	Outposts	7 Mo. 1954	7 Mo. 1953	7 Mo. 1954	7 Mo. 1953
Alabama											5			5												41			41	44	41	44
Arizona																										8			8	6	8	6
Arkansas											10			10	2		1	2		1	1			7	19	51		4	55	70	62	89
California	1									1	17			18	12		2	4		1	3		1	23	47	184		2	186	267	209	314
Colorado	5		1	1						7	55			62	29	3	10	1			1		1	45	26	275		4	279	167	324	193
Florida											4			4	1									1		17			17	20	18	20
Georgia											4			4												7			7	3	7	3
Idaho																														4		4
Illinois				4			4			8	69			77	16			18			35			69	46	336			336	248	405	294
Indiana	1									1	26			27	8		2							10	27	139			139	202	149	229
Kansas	10		4				1			15	70			85	59		13	4		1	4		1	82	102	442		1	443	512	525	614
Kentucky	2									2	5			7	20									20	16	28			28	64	48	80
Louisiana	4	1	3	4	5		1		1	19	41		2	62	21	14	11	27	20	8	1	2	1	105	79	215		8	223	211	328	290
North Louisiana	3		1	1	1					6	18			24	4	1	2	5	1	3				16	16	77		1	78	105	94	121
South Louisiana	1	1	2	3	4		1		1	13	23		2	38	17	13	9	22	19	5	1	2	1	89	63	138		7	145	106	234	169
Michigan	1									1	16			17	8						1			9	14	132			132	133	141	147
Mississippi	1									1	12			13	2							1		3	18	88		3	91	122	94	140
Missouri															1											6			6	8	6	8
Montana	1									1	5			6	4		1	2						7	9	46			46	51	53	60
Nebraska	1									1	9			10	13		3	1			3			20	18	64		1	65	89	85	107
Nevada															1									1		7			7	7	8	7
New Mexico	2		9	1			1			13	12			25	11		26	3	2		5			47	30	100		1	101	80	148	110
North Dakota											12			12	1			1			2			4	8	61			61	30	65	38
Ohio																					3		3	6	3	7			7	10	13	13
Oklahoma	8	2	3	1			4			18	80			98	64	8	13	16	1	1	45	2	2	152	146	416			416	413	568	559
Pennsylvania																										1						1
South Dakota											1			1	1									1		9			9	8	10	8
Texas	58	7	9	23	6	4	13	1	1	122	392		6	520	324	47	56	132	38	14	68	10	12	701	702	2414		37	2451	2480	3152	3182
Dist. 1 S. Central	1		2	1			1		1	6	37			43	18	2	5	1	1	1	6	2	2	38	18	162		1	163	194	201	212
Dist. 2 Middle Gulf	2	2	3	1	1	1				10	23			33	5	8	11	3	2	2	3	1	2	37	41	153		3	156	164	193	205
Dist. 3 Upper Gulf	3	2		6	4	1				16	40		5	61	15	8	2	41	16	4	1			87	100	234		22	256	250	343	350
Dist. 4 L. Gulf-S.W.	1	2		4	1	1				9	30			39	14	17	2	28	15	3	2	5	2	88	122	217		5	222	270	310	392
Dist. 5 E. Central											12			12				1			1			2	7	82			82	74	84	81
Dist. 6 Northeast		1								1	12			13	2	2	1		1					6	11	91		2	93	83	99	94
Dist. 7-B N. Cent.	26		2	1			4			33			1	33	102		17	11			8		2	140	156	505		1	506	555	646	711
Dist. 7-C W. Cent.	4						1			5	26			31	28	3	6	6	1	1	6		1	52	63	203		1	204	200	256	263
Dist. 8 West	7			7			5	1		20	35			55	62	2	3	20	1	2	32	1	2	124	72	243		1	244	214	368	286
Dist. 9 North	14		1	2			2			19	77			96	76	3	3	20			9		1	112	110	488		1	489	474	601	584
Dist 10 Panhandle			1	1		1				3	4			7	2	2	6	1	1	1		1	1	15	2	36			36	2	51	4
Utah			1							1	4			5	2		2							4	8	18			18	29	22	37
West Virginia																																
Wyoming	2									2	16			18	47		2	7			3			59	16	117			117	67	176	83
Total U.S.	97	10	30	34	11	4	24	1	2	213	865		8	1060	646	72	142	218	61	26	175	15	21	1376	1335	5228		61	5289	5345	6665	6680

Exploratory Success High

July most active month of year. Seven-month total only 15 wells behind 1953 period.

By CECIL W. SMITH, WORLD OIL Staff

STEPPED UP exploratory drilling during July resulted in completion of 1086 wells, making the month the most active this year. The month's wells boosted the year's seven-month total to 6665, which was only 15 wells or 0.2 percent fewer than was drilled in the same period of peak 1953.

Although fewer tests were drilled this year than in the corresponding period of 1953, a greater number proved to be producers, giving the year's efforts a better-than-average score. A total of 1376 successful exploratory wells amounted to 20.6 percent of the total drilled, while last year's 1335 amounted to 20 percent, which itself was above average.

Nearly three-fourths of the nation's exploration drilling is done in five states. This year these five's activity did not conform to any pattern. Two upped operations substantially, another slightly, and the remaining two saw drilling decline.

Texas, the leader, saw exploratory efforts lowered from last year's by 1 percent. As Texas accounts for more than 47 percent of the U. S. activity, this drop was clearly reflected in the national total. Oklahoma, with its operations accounting for 8.5 percent of the whole, increased its activity over last year by 1.6 percent. The only other loser in the top five states was Kansas, where this year 14.5 percent fewer wildcats were drilled, but it still held firmly to the No. 3 exploratory drilling spot.

Summary of Results of Exploratory Drilling

ITEM	July, 1954	June, 1954	SEVEN MONTHS January-July 1954	1953	Percent Diff.
Oil Discoveries	131	121	864	835	+ 3.5
New Fields	97	97	646	596	+ 8.4
New Pays	34	24	218	239	— 8.8
Distillate Discoveries	21	26	133	99	+34.3
New Fields	10	19	72	65	+10.8
New Pays	11	7	61	34	+79.4
Gas Discoveries	34	18	168	157	+ 7.0
New Fields	30	16	142	129	+10.1
New Pays	4	2	26	28	— 7.2
Total Discoveries	186	165	1165	1091	+ 6.8
Extensions to Fields	27	21	211	244	— 3.5
Oil Fields	24	17	175	199	—12.1
Distillate Fields	1	3	15	20	—25.0
Gas Fields	2	1	21	25	—16.0
Total Prod. Tests	213	186	1376	1335	+ 3.1
Dry Holes	873	805	5289	5345	— 1.1
Wildcats	865	791	5228	5244	— 0.3
New Pays					
Outposts	8	14	61	101	—39.6
Total Expl'tory Tests	1086	991	6665	6680	— 0.2
Percent Productive	19.6	18.8	20.6	20.0	
Percent Dry	80.4	81.2	79.4	80.0	

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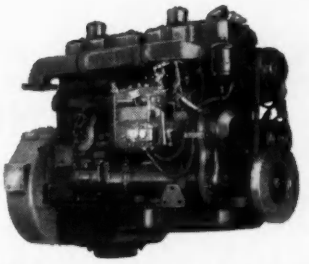
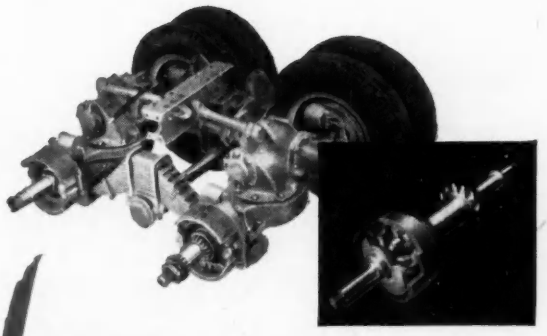
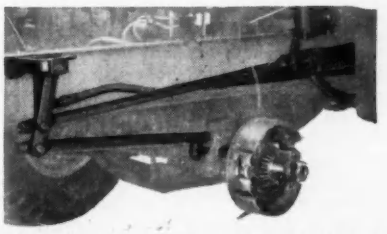


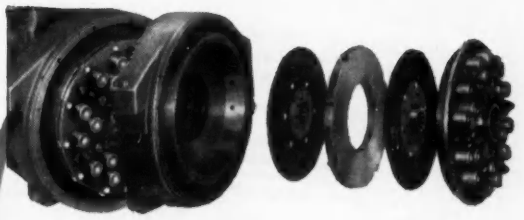
Plentiful Horsepower. Mack provides the right powerplant, gasoline or diesel, to haul most efficiently, most profitably for each specific operation. Complete range of engine options up to 400 horsepower. Coupled with the most rugged transmission or torque converters yet developed.



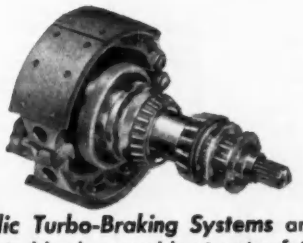
Balanced Bogie With Power-Divider. Only Mack six-wheelers offer the unique advantage of Mack's Balanced Bogie, incorporating the exclusive Power-Divider. With the Mack Power-Divider torque is distributed between bogie axles in proportion to traction, thus enabling Macks to pull through where other trucks mire in.



Power-Steering. Hydraulic power-steering permits effortless, fast steering and positive, shockless control.



Air-Assist Clutch. Operation of the big, double-plate clutch is virtually effortless, reduces driver fatigue.



Hydraulic Turbo-Braking Systems and powerful air-actuated brakes provide utmost safety for downhill going, assure safe and positive driver control at all times.

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U. S. Discoveries in July

NEW FIELDS, NEW PAYS AND EXTENSIONS

CALIFORNIA—NEW OIL FIELD

Orange County, "Sunset Beach" field. Burt Aston's Lomita 2, in 19-5s-11w, flowed 720 barrels from 7052-7185 feet, 13/64-inch, 29-gravity, completed 6-24-54, TD 8707.

COLORADO—NEW OIL FIELDS

Logan County. Braden & Hooyer's Van Grudy 1, NW NW SW 2-7n-54w, pumped 86 barrels from "J" sand, Upper Cretaceous 4990-5021 feet, completed 7-15-54, TD 5021.

Unnamed field. British American Oil Producing Co.'s Watts 1, C NE SW 12-9n-54w, pumped 153 barrels from "D" sand, Upper Cretaceous 4964-5232 feet, completed 7-5-54, TD 5232.

Morgan County. H. L. Hunt's George Huey et al 1, SE SE 21-2n-56w, pumped 30 barrels from "D" sand, Upper Cretaceous 5064-70 feet, completed 7-24-54, TD 5187.

Unnamed field. O'Donnell & Edmondson & Sinclair Oil Co.'s Jacobson 1, SW SW SW 25-5n-60w, pumped 155 barrels from "J" sand, Upper Cretaceous 6168-90 feet, 39-gravity, completed 6-30-54, TD 6351.

Washington County. Halbert & Jennings' Blake 1, C NW SE 22-1s-55w, pumped 70 barrels from "D" sand, Upper Cretaceous 4831-35 feet, completed 7-19-54, TD 5023.

COLORADO—NEW OIL PAY

Moffat County Moffat field. The Texas Co.'s Knowlton 14, in 9-4n-91w, pumped 19 barrels oil and 18 barrels water from Shinarump sand, Triassic 5280-97 feet, completed 1-18-54, TD 6473.

COLORADO—NEW GAS FIELD

Morgan County. Petroleum Inc.'s Schwindt 1, C SW NE 13-3n-59w, flowed 4.9 million from "J" sand, Upper Cretaceous 5920-36 feet, ¾-inch, completed 7-6-54, TD 6010.

ILLINOIS—NEW OIL PAYS

Effingham County, Hill, East field. Partlow & Cochonour's Wright 1, NE SE NE 10-6n-6e, pumped 190 barrels from Rosiclare lime, Mississippian 2640-42 feet, completed 7-6-54, TD 2670.

Marion County, Luka field. Welker Oil Co.'s O. Fatheree 1, SE SW SE 10-2n-4e, pumped 332 barrels from Lower O'Hara lime, Mississippian 2620-25 feet, and Rosiclare lime, Mississippian 2632-36 feet, completed 7-20-54, TD 2830.

Saline County, Eldorado, East field. G. L. Reasor's G. Shave et al 1, NE SW SW 23-8s-7e, pumped 15 barrels oil and 4 barrels water from Rosiclare lime, Mississippian 2975-79 feet, completed 8-3-54, TD 3038.

White County, Norris City field. Atlas Drilling Co.'s Harrell 3, SW NE SW 33-6s-8e, flowed 81 barrels from McClosky lime, Mississippian 3076-80 and 3137-42 feet, completed 7-27-54, TD 3142.

ILLINOIS—OIL FIELD EXTENSIONS

Bond County, Dudleyville, East field. Hoiles Petroleum Co.'s Enloe 1, SW SE NW 6-4n-2w, 1¼-mile extension, pumped 42 barrels oil and 268 barrels water from Devonian lime, Devonian 2369-74 feet, completed 7-27-54, TD 2405.

Clay County, Sailor Springs, Consolidated field. Sanders & Fye Drilling Co.'s Griffy-Leonard Comm. 1, SE SE SE 4-4n-7e, ¾-mile extension, pumped 55 barrels oil and 25 barrels water, from Cypress sand, Mississippian 2568-80 feet, completed 7-13-54, TD 2953.

Crawford County, Main field. G. F. Critchfield's Brown 1, NW NE SW 23-7n-12w, 1-mile extension, pumped 35 barrels oil and 70 barrels water from Pennsylvanian sand, Pennsylvanian 971-76 feet, completed 7-20-54, TD 1154.

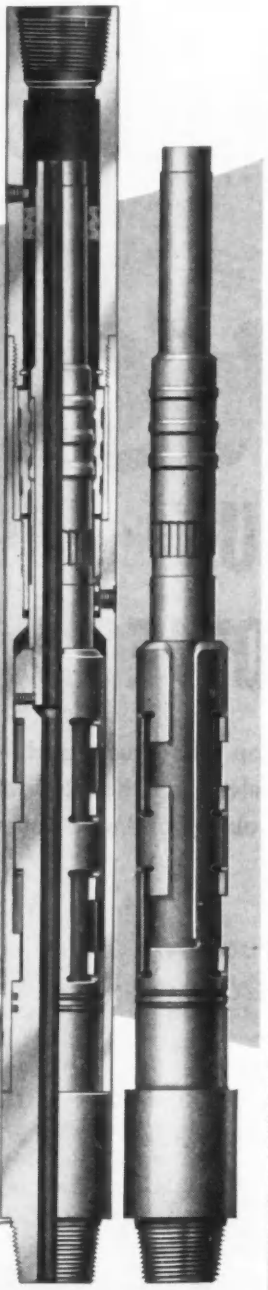
Gallatin County, Roland Consolidated field. T. Glass' I. West 1, NW SW NE

SEALED TYPE "I" BOWEN JAR SAFETY JOINTS

BOWEN PRESENTS

SEALED LUBRICATION

for Less Wear
Reduced Servicing
Constant Tripping Tonnage



SEALED TYPE "I" BOWEN JAR SAFETY JOINTS are filled with oil and sealed top and bottom. The Sealed construction enables the tool to transmit circulating fluid at any pressure and prevents any contact between the well fluid and the working parts of the tool. With this arrangement, the moving parts work in a bath of oil.

SEALED TYPE "I" BOWEN JAR SAFETY JOINTS are compact combination units designed to provide the services of both rotary jars and safety joints. They are installed as safety devices in strings during testing, coring, reaming, drilling, sidetracking and washing over operations and are also used during fishing operations. At the will of the operator they will either deliver heavy upward or downward blows against a stuck string or fish —or they can be disengaged to salvage all the string that is above them. Besides sealed lubrication they feature:

ADJUSTABILITY IN THE HOLE *You can increase the tripping tonnage without coming out of the hole.*

FULL OPENING *Oversize circulation hole permits use of wire line tools and allows passage of large volumes of fluid.*

OUTSTANDING ADVANTAGES AS A JAR

The tripping mechanism in the SEALED TYPE "I" BOWEN JAR SAFETY JOINTS is a straight pull mechanical type.

Torque free operation eliminates any aggravating tendency to release fishing tools, reduces equipment wear, and avoids hazards.

Because the tripping mechanism is purely mechanical, heavy blows can be struck despite packing failures or high temperatures and the same heavy blows will be delivered regardless of whether the string is elevated slowly or rapidly.

The tripping pull can be increased while the tool is in the hole or the tripping pull can be either increased or decreased while the complete tool or just the Bowl Assembly is at the surface. After considerable use, the wearing parts in SEALED TYPE "I" BOWEN JAR SAFETY JOINTS can be replaced easily and economically and the tool will regain all the properties of a new one.

OUTSTANDING ADVANTAGES AS A SAFETY JOINT

SEALED TYPE "I" BOWEN JAR SAFETY JOINTS will deliver the full torque capacity of the string in either direction.

At the will of the operator, the Bowl Assembly can be separated from the Main Mandrel Assembly of the tool to salvage all of the string that is above it.

Later the Bowl Assembly can be reengaged with the Main Mandrel Assembly in the hole for subsequent recovery operations.

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26-7s-8e, 1¼-mile extension, pumped 10 barrels oil and 12 barrels water from Cypress sand, Mississippian 2547-55 feet, completed 8-3-54, TD 2591.

KANSAS—NEW OIL FIELDS

Cowley County, Church field. Saco Oil Co.'s Church 1, SW SE SW 13-31s-6e, pumped 10 barrels from Mississippi lime, Mississippian 2947-55 feet, TD 2955.

Ellis County, Dinges field. Frontier Oil Co.'s Dinges 1, NE NE NE 9-15s-18w, pumped 53 barrels from Arbuckle lime, Ordovician 3626-36 feet, TD 3636.

Ellsworth County, Green Gorden field. El Dorado Refining Co.'s Brown 1, NE SE NW 1-17s-9w, pumped 25 barrels from Lansing lime, Pennsylvanian 3046-50 feet, TD 3267.

Reno County. Schermerhorn Oil Co.'s Morris 1, C N/2 NE NW 12-25s-10w, pumped 23 barrels from Mississippi lime, Mississippian 3884-95 feet, TD 4347.

Rooks County. D. G. Hansen's Desterreich 1, SE SE NE 8-10s-20w, potentialed 3000 barrels from Arbuckle lime, Orodovician 3814-25 feet, TD 3825.

Rush County, Rush Center, Northeast field. Imperial Drilling Co.'s Krug 1, SW SW SE 10-18s-18w, pumped 523 barrels from Arbuckle lime, Orodovician 3788.

Stafford County, Saterlee field. Gulf Oil Corp's Saterlee, NE NE NW 31-24s-14w, pumped 45 barrels from Mississippi conglomerate, Mississippian 4168-77 feet, TD 4240.

Sumner County. Beardmore Drilling Co.'s Muehlenbrook 1, NW NW SE 5-33s-3w, pumped 63 barrels from Lansing lime, Pennsylvanian 3416-20 feet, TD 3420.

Unnamed field. Orville Parker's Miller 2, SW NW NW 19-34s-2e, pumped 50 barrels from Cleveland sand, Pennsylvanian 3210-32 feet, TD 3275.

Ashton, Southwest field. Fred Ayesh's Wolf 1, NE NW SE 24-34s-1e, pumped 20 barrels from Cleveland sand, Pennsylvanian 3190-3208 feet, TD 3264.

KANSAS—OIL FIELD EXTENSION

Graham County, Cooper, North field. El Dorado's Cox 2, SE NE NW 33-9s-21w, ½-mile northeast extension, pumped 199 barrels from Arbuckle lime, Ordovician 3875-86 feet, TD 3886.

KANSAS—NEW GAS FIELDS

Barber County. Imperial Drilling Co.'s Ott 1-A, SE NW SW 6-34s-13w, flowed 1.8 million from Mississippi sand, Mississippian 4889-95 feet, TD 5010.

Rhodes, North field. Musgrove Petroleum Co.'s Early 1, SE SE SW 4-33s-11w, flowed 8.3 million from Mississippi lime, Mississippian 4423-48 feet, TD 4983.

Seward County. Northern National Gas Co.'s Collingwood 1-A, C SW SW 4-32-32, flowed 1.5 million from Herrington sand, Permian 2676-5010 feet, TD 5025.

Stanton County. J. M. Huber Corp.'s Sparks 1, C NE 34-30s-42w, flowed 16.0 million from Keyes sand, Pennsylvanian 5254-84 feet, open, TD 5554.

KENTUCKY—NEW OIL FIELDS

Union County. George S. Engle's Katherine Taylor 1, in 9-0-18, pumped 100 barrels from Aux Vases lime, Mississippian 2835-45 feet, TD 2845.

Unnamed field. Ryan Oil Co.'s W. F. Clements 1, 7-0-20, pumped 31 barrels oil and 5 barrels water from McClosky lime, Mississippian 2654-61 feet, TD 2661.

NORTH LOUISIANA—NEW OIL FIELDS

Concordia Parish, Milestone Forks field. Durbin Bond & Co. & Petersen Drilling Co. & Union Producing Co.'s H. A. Turner 1, in 20-8n-10e, flowed 119 barrels from Wilcox sand, Eocene 5313-15 feet, 9/64-inch, 44-gravity, completed 7-28-54, TD 6212.

Waverly Point field. E. C. Wentworth & Como Drilling Co.'s Murray 2, in 11-7n-10e, flowed 106 barrels from Wilcox sand, Eocene 5564-5572, 12/64-inch, completed 7-15-54, TD 6223.

Webster Parish. Hunt Oil Co. et al's Ardis C. Burns et al Unit 1, in 9-23n-9w, flowed 248 barrels from Smackover lime, Jurassic 11,065-102 and 11,112-132 feet, 12/64-inch, 47-gravity, completed 7-25-54, TD 11,681.

NORTH LOUISIANA—NEW OIL PAY

Concordia Parish, Clayton field. W. L. Billups, Gaughier & Heard's Miller et al 1, in 40-8n-10e, flowed 138 barrels from Artman sand, Eocene 5147-49 feet, 9/64-inch, 41-gravity, completed 7-22-54, TD 6010.

NORTH LOUISIANA—NEW DISTILLATE PAY

Bienville Parish, Bistineau field. Midstates Oil Corp.'s Carter Fee 1, in 12-16n-10w, Old Well Drilled Deeper, flowed 25 barrels distillate and 10 million from Cotton Valley "D" sand, Upper Cretaceous 7986-8010, open, completed 7-2-54, TD 8207.

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NORTH LOUISIANA—NEW GAS FIELD

Lincoln Parish, Clay field. Southwest Gas Producing Co. & W. C. Feazel's Redwine 1, in 11-17n-3w, Old Well Worked Over, flowed 0.5 million from Cotton Valley "D" sand, Upper Cretaceous 10,070-146 feet, open, completed 7-15-54, TD 10,638.

SOUTH LOUISIANA—NEW OIL FIELD

Plaquemines Parish, Main Pass area. The California Co.'s State 2449-1, Block 24, Gulf of Mexico, flowed 40 barrels from 7451-55 feet, ⅛-inch, 26-gravity, completed 7-1-54, TD 9504.

SOUTH LOUISIANA—NEW OIL PAYS

LaFourche Parish, Bay Marchand-Block 2. The California Co.'s State Lease 1367 I-4, Gulf of Mexico, flowed 237 barrels from 4060-90 feet, 16/64-inch, 25-gravity, completed 7-9-54, TD 4127.

Plaquemines Parish, Dixon Bay field. The California Co.'s G. T. Armstrong Unit 2-1, flowed 130 barrels from Upper Miocene 8732-49 feet, 7/64-inch, 30.7-gravity, completed 7-29-54, TD 10,526.

St. Mary Parish, Eugene Island-Block 126 field. Magnolia Petroleum Co.'s State Lease 691-F-3, Block 119, Gulf of Mexico, flowed 220 barrels from 6160-90 feet, 10/64-inch, 37.5-gravity, completed 7-10-54, TD 6881.

SOUTH LOUISIANA—OIL FIELD EXTENSION

Iberville Parish, St. Gabriel field. Continental Oil Co.'s Natalbany Lumber Co.'s 1, in 19-9s-2e, ½-mile south extension, flowed 141 barrels oil and 210 barrels water from 7704-13 feet, 10/64-inch, 54-gravity, completed, 7-13-54, TD 9500.

SOUTH LOUISIANA—NEW DISTILLATE FIELD

Cameron Parish, West Cameron area. Continental's State Lease 1656 A-1, Block 192, Gulf of Mexico, flowed 41 barrels distillate and 4.2 million from 8810-25 feet, 16/64-inch, completed 7-16-54, TD 14,040.

SOUTH LOUISIANA—NEW DISTILLATE PAYS

Acadia Parish, Rayne field. Continental and Sun Oil Co.'s W. Petijean 2, in 4-9s-2e, flowed 185 barrels distillate and 3.0 million from 10,756-855 feet, 8/64-inch, 47.1-gravity, completed 7-12-54, TD 14,120.

Cameron Parish, Pecan Lake, South field. Pan American Production Co.'s Miami Corp. 16, in 5-15s-3w, flowed 75 barrels oil and 4.4 million from 8250-70 feet, ¼-inch, 45.4-gravity, completed 6-28-54, TD 8365.

Jefferson Parish, Little Lake field. Richardson & Bass' State Lease 2383-1-A, in 18s-23e, Old Well Worked Over, flowed 25 barrels distillate and 1.0 million from 9390-96 feet, ⅛-inch, 56.6-gravity, completed 7-15-54, TD 12,500.

Queen Bess Island field. The Texas Co.'s State 12, in 20s-25e, Barataria Bay, flowed 110 barrels distillate and 9.1 million from 12,454-481, 10/64-inch, 44-gravity, completed 7-15-54, TD 16,045.

SOUTH LOUISIANA—NEW GAS FIELDS

St. Bernard Parish, Chandeleur Sound area. The Texas Co.'s State Lease 2461-1, Block 69, 15s-19e, flowed 0.9 million from 7013-22 feet, ⅛-inch, completed 7-1-54, TD 9564.

Point Comfort field. Phillips Petroleum Co.'s State Lease 2306-1, Chandeleur Sound, flowed 0.9 million from 6248-58 feet, ⅛-inch, completed 7-2-54, TD 9500.

SOUTH LOUISIANA—OIL FIELD EXTENSIONS

Iberville Parish, Sullivans Lake field. Union Producing Co.'s Templet A-1, in 17-10s-11e, ½-mile southwest extension, flowed 2.9 million from Lower Miocene 11,013-020 feet, 3/16-inch, completed 7-27-54, TD 11,202.

Terrebonne Parish, Hollywood field. Tidewater Associated Oil Co.'s Houma Community 1, in 101-17s-17e, ¾-mile southeast extension, ungauged from 12,970-994 feet, completed 7-7-54, TD 14,508.

MICHIGAN—NEW OIL FIELD

Clare County. Basin Oil Co. & Wm. B. Stewart's Robertson Estate 1, NE SE SW 6-18n-5w, pumped 25 barrels oil and 30 barrels water from Dundee lime, Devonian 3968-70 feet, TD 3976.

MISSISSIPPI—NEW OIL FIELD

Hinds County, Bolton field. Larco Drilling Co.'s Lettie McAlpin et al 1, NE SE 19-6n-2w, flowed 293 barrels from Paluxy sand, Lower Cretaceous 9920-40 feet, 8/64-inch, 36-38-gravity, completed 7-29-54, TD 9951.

MONTANA—NEW OIL FIELD

Pondera County. Western Oil Co.'s Bills 1, SW SE SW 31-28n-6w, pumped 218 barrels from Madison sand, Mississippian 3329-35 feet, completed 7-1-54, TD 3410.

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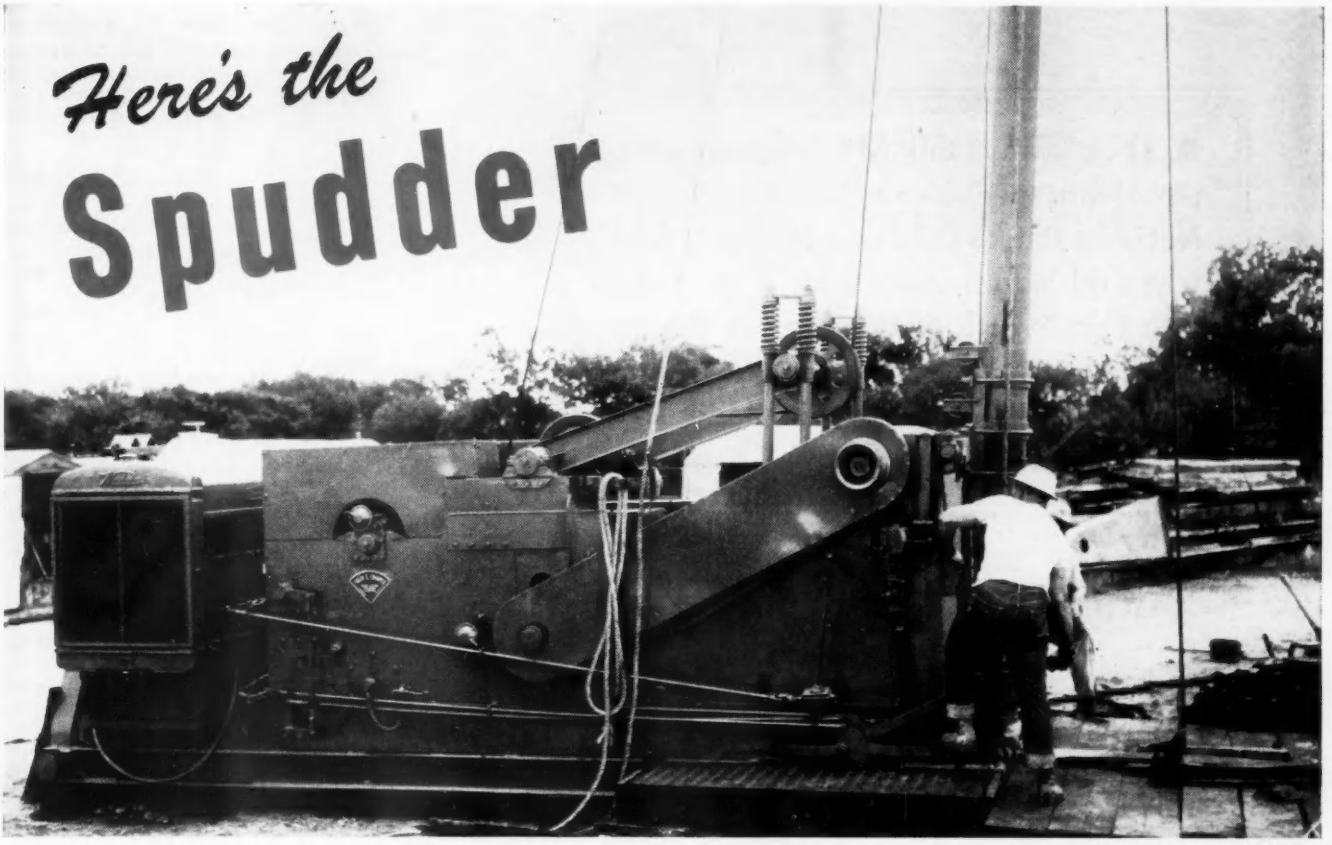

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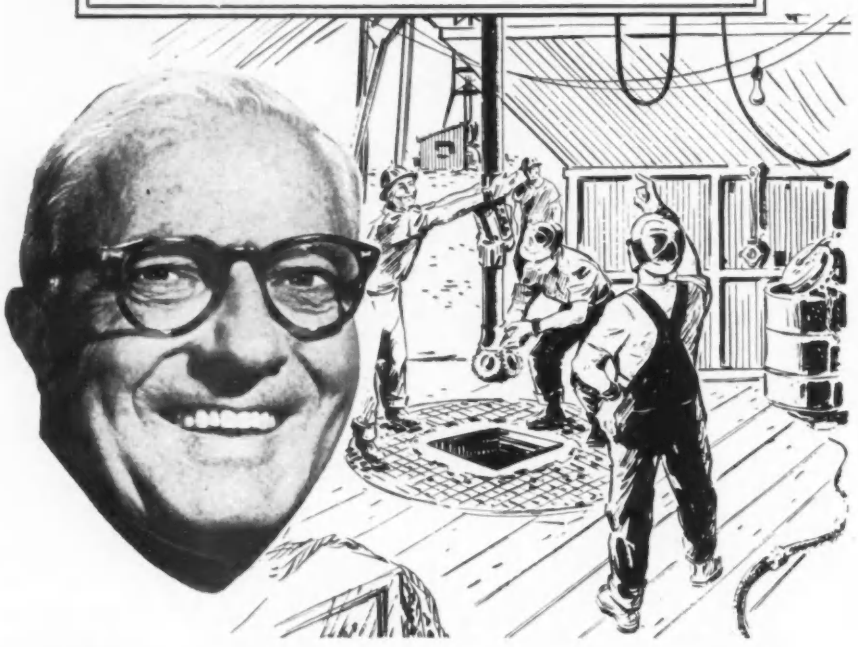

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NEBRASKA—NEW OIL FIELD

Banner County. Harry Royster's Downer 1, C NE NE 11-18n-56w, pumped 30 barrels from "J" sand, Upper Cretaceous 6030-37 feet, completed 7-30-54, TD 6074.

NEW MEXICO—NEW OIL FIELDS

Lea County. Edward E. Kinney's Magnolia-State 1, in 32-19s-33e, pumped 200 barrels from Seven Rivers lime, Permian 3243-80 feet, 31-gravity, completed 7-9-54, TD 3340.

Unnamed field. Sunray Oil Corp.'s State 1-B, in 16-12s-32e, pumped 104 barrels from Queen sand, Permian 3008-25 feet, 36-gravity, completed 7-13-54, TD 3025.

NEW MEXICO—NEW OIL PAY

Lea County, Unnamed field. Neville G. Penrose's McGruder-State 1, in 28-20s-36e, flowed 100 barrels from Seven Rivers sand, Permian 3860-3942 feet, 12/64-inch, 36-gravity, completed 7-6-54, TD 3942.

NEW MEXICO—NEW GAS FIELDS

Lea County. Charm Oil Co. & Southern Petroleum Exploration's State 1, in 33-20s-36e, flowed 8.0 million from Seven Rivers sand, Permian 3849-99 and 3904-39 feet, completed 6-15-54, TD 4085.

Rio Arriba County. El Paso Natural Gas Co.'s San Juan 28-5 Unit 2, NE SW SW 14-28n-5w, flowed 1.2 million from Mesaverde sand, Upper Cretaceous 6007-6170 feet, completed 3-2-54, TD 6170.

Unnamed field. El Paso's San Juan 28-7 Unit 12, SE NW SW 17-28n-7w, flowed 1.0 million from Mesaverde sand, Upper Cretaceous 3427-5800 feet, completed 7-29-54, TD 7957.

Unnamed field. El Paso's San Juan 28-7 Unit 15, NW SE SW 29-27n-7w, flowed 0.9 million from Pictured Cliffs sand, Upper Cretaceous 2840-2954 feet, completed 6-23-54, TD 2954.

Unnamed field. Phillips' Mesa Unit (2-29) 30-5, SW NE NE 29-30n-5w, flowed 4.5 million from Mesaverde sand, Upper Cretaceous 5641-6290 feet, completed 7-28-54, TD 6290.

Unnamed field. Southern Union Gas Co.'s Jicarilla 1-D, SE NW NW 32-26n-3w, flowed 0.4 million, from Pictured Cliffs sand, Upper Cretaceous 3804-84 feet, completed 7-8-54, TD 3884.

Unnamed field. Superior's Dealy 1-7, NE SW SE 7-25n-6w, flowed 0.7 million from Pictured Cliffs sand, Upper Cretaceous 2715-35 feet, completed 7-18-54, TD 8144.

San Juan County. Delhi Oil Co.'s Florance 46, NW SE NE 29-30n-8w, flowed 5.5 million from Mesaverde sand, Upper Cretaceous 4613-5394 feet, completed 7-15-54, TD 8100.

Unnamed field. J. Glenn Turner's Turner-Crandall 2-11, NW SE SE 11-26n-9w, flowed 2.1 million from Pictured Cliffs, Upper Cretaceous 1986-2031 feet, completed 7-31-54, TD 2031.

NEW MEXICO—GAS FIELD EXTENSION

San Juan County. J. Glenn Turner's Turner-Crandall 1-11, NE SW SW 11-26n-9w, ⅝-mile west extension, flowed 2.1 million from Pictured Cliffs sand, Upper Cretaceous 1934-76 feet, completed 7-31-54, TD 1976.

OKLAHOMA—NEW OIL FIELDS

Carter County. Fain-Porter Drilling Co.'s

Continental Drilling Company officials, pictured left to right, are: Marshall A. Smith, Sr., V.P.; Baker R. Littlefield, Pres.; J. O. Sharon, Drilling Supt.; Marshall A. Smith, Jr., Secy. and Gen. Mgr.

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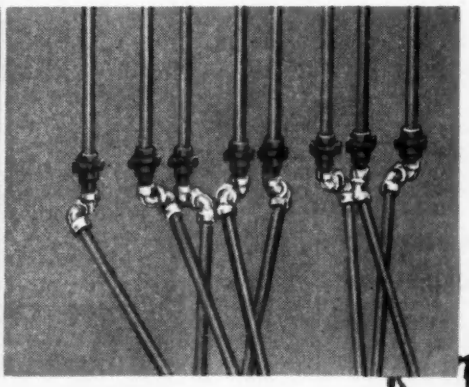

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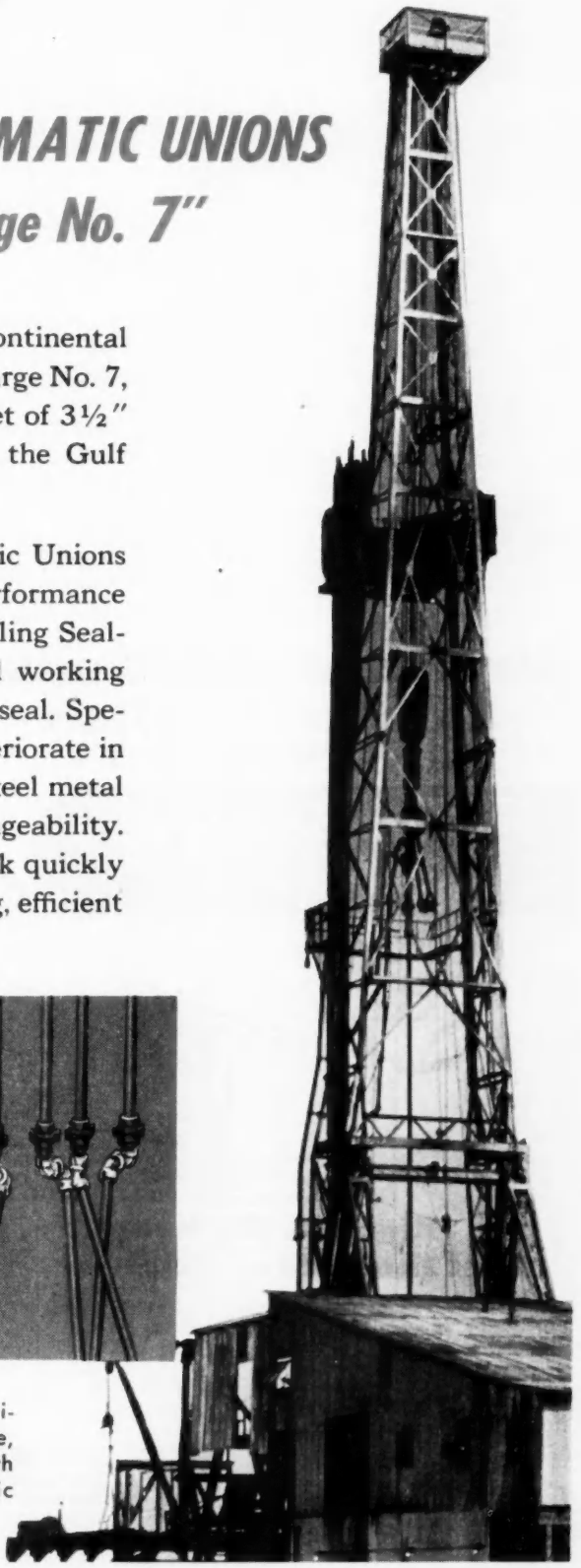

Isbell 1, SE SE SW 2-5s-1w, pumped 223 barrels from Lower Tussy sand, Pennsylvanian 5839-54 feet, 29-gravity, TD 6508.

Creek County. J. O. Hayes & J. C. Verser's Stevenson 1, SE NW NE 3-18n-9e, flowed 7 barrels from Skinner sand, Pennsylvanian 2015-30 feet, TD 2914.

Garvin County. Anderson-Prichard's Bullock 1, C NW SE 19-4n-3w, flowed 129 barrels from Hartshorne sand, Pennsylvanian 7622-39 feet, ¼-inch, 62-gravity, TD 7830.

Kay County, Hubbard, North field. Russell Cobb, Jr.'s Pamela 1, SE NE NE 36-27n-2w, pumped 28 barrels oil and 8 barrels water from Oswego lime, Pennsylvanian 3460-70 feet, and Mississippi lime, Mississippi 3615-36 feet, TD 3702.

Lincoln County, Baker field. Woodward & Co.'s Trawick 1, NE NE NE 26-16n-5e, pumped 20 barrels oil and 5 barrels water from Skinner sand, Pennsylvanian 3310-73 feet, TD 3601.

Mt. Vernon, South field. Lee Evans Drilling's Autumn Sudheimer 1, SE NW SW 24-15n-3e, flowed 180 barrels from Cleveland sand, Pennsylvanian 3356-63 feet, 14/64-inch, 52.2-gravity, TD 5080.

Osage County, Whitetail, South field. Sunray Oil Corp.'s Osage 1-A, SW SW SW 7-26n-10e, flowed 144 barrels oil and 108 barrels water from Mississippi lime, Mississippian 2012-21 feet, TD 2021.

Payne County, Schlegal, East field. Neil A. Jackson et al's Cook 1, SW SE NE 27-18n-6e, pumped 16 barrels oil and 3 barrels water from Wilcox sand, Ordovician 3436-42 feet, 41-gravity, TD 3450.

OKLAHOMA—NEW OIL PAY

Stephens County, Nellie, North field. Shebester Toland & Reeves, Inc.'s Arthur Tullaus 1, SE SE SW 35-2n-9w, pumped 68 barrels oil and 8 barrels water from Pennsylvanian sand, 3532-70 feet, 37-gravity, TD 3625.

OKLAHOMA—OIL FIELD EXTENSIONS

Creek County, Tibbens field. Heyser & Heard's E. Mills 1, NW NW NE 33-15n-9e, east extension, flowed 20 barrels from Skinner sand, Pennsylvanian 2327-40 feet, ¼-inch, 40-gravity, TD 2400.

Kay County, Sumpter field. C-G Drilling Co.'s Kelle 1, NW NW NE 27-28n-1w, flowed 30 barrels from Bartlesville sand, Pennsylvanian 3395-3407 feet, 36-gravity, TD 3407.

Okfuskee County, Cary field. Smokey Foster's Sperry 2, SW SE NW 25-12n-10e, east extension, pumped 3 barrels from Gilcrease sand, Pennsylvanian 2814-31 feet, 39-gravity, TD 3102.

Seminole County, Sylvian field. Lee Evans Drilling Co.'s C. R. Gilmore 1, SE SE NE 26-11n-7e, ½-mile northwest extension, flowed 32 barrels oil and 2 barrels water from Cromwell sand, Pennsylvanian 3569-76 feet, 5/16-inch, 35-gravity, TD 3576.

OKLAHOMA—NEW DISTILLATE FIELDS

Grant County. Davis & Wharton Drilling Co.'s Cole 1, SW NE NW 31-28n-3w, flowed 1 barrel distillate and 30.0 million from Skinner sand, Pennsylvanian 4518-42 feet, open, TD 5178.

Lincoln County. Russell Cobb Jr.'s A. L. Davenport 1, NW NW SW 28-15n-2e, flowed 15 barrels distillate and 2.8 million from Lower Skinner sand, Pennsylvanian 4625-35 feet, open, TD 5402.

OKLAHOMA—NEW GAS FIELDS

Beaver County, Mocane, Southeast field. The Texas Co.'s L. J. Barby 1-A, NW NW 2-4n-25ecm, flowed 6.0 million from Morrow sand, Pennsylvanian 6752-86 feet, TD 6898.

Kay County. C. L. Carlock's Boxley 1, NE NE NE 36-27n-4e, flowed 7.6 million from Skinner sand, Pennsylvanian 2992-3000 feet, 1/64-inch, TD 3241.

Pontotoc County, Jones Chapel, West field. John H. Stapleton's Bumpers 1, C NW NW 34-4n-5e, flowed 4.5 million from Wetumka sand, Pennsylvanian 875-79 feet, TD 1430.

TEXAS—DISTRICT 1—NEW OIL FIELD

Guadalupe County. V. E. Nicholson's Max L. Webb 1, James Hinds Survey, Old Well Worked Over, pumped 7 barrels oil and 1 barrel water from Buda lime, Lower Cretaceous 2640-55 feet, completed 4-9-54, TD 2728.

TEXAS—DISTRICT 1—NEW OIL PAY

McMullen County, San Miguel Creek field. Humble O & R Co.'s Louis M. Gubbels 1-B, G. H. Smith Survey #26, flowed 266 barrels from Wilcox sand, Eocene 5741-59 feet, 3/16-inch, 29-gravity, completed 7-28-54, TD 11,010.

TEXAS—DISTRICT 1—OIL FIELD EXTENSION

Bexar County, Saspamco field. M. P. Wilson's Ika A. Werner 1, Jose de la Garza

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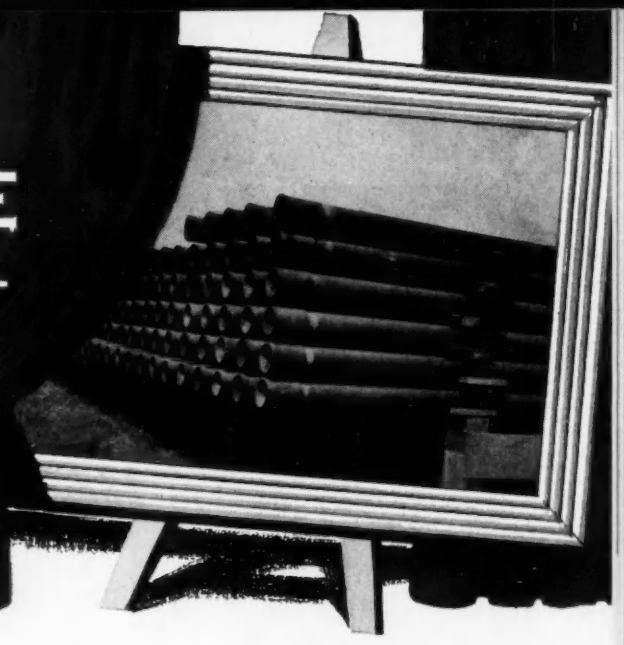

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Survey, north extension, flowed 208 barrels from Austin chalk, Upper Cretaceous 2643-2800 feet, ¼-inch, 26-gravity, completed 7-23-54, TD 2800.

TEXAS—DISTRICT 1—NEW GAS FIELDS

McMullen County. Argo Oil Corp.'s H. C. Edrington Est. 5-P, AB&M Survey, flowed 0.4 million from Frio sand, Oligocene 1548-58 feet, open, completed 6-25-54, TD 3104.

Wilson County. G. R. Schimmel & L. L. Palmer's B. F. Johnson Heirs 1, A. Green Survey 275, unguaged from Carrizo sand, Eocene 444-46 feet, TD 475.

TEXAS—DISTRICT 1—GAS FIELD EXTENSION

Wilson County, Unnamed field. G. R. Schimmel & L. L. Palmer's S. C. Robles 1, M. Herrera Survey #435, 1-mile southwest extension, ungauged from Carrizo sand, Eocene 481-86 feet, TD 520.

TEXAS—DISTRICT 2—NEW OIL FIELDS

Karnes County, Runge, East field. Geochemical Surveys, et al's D. E. Lyons 1, Victoriano Zepeda Grant, flowed 240 barrels from Lower Frio sand, Oligocene 9083-93 feet, 6/64-inch, 37-gravity, completed 6-19-54, TD 9630.

Live Oak County. Texita Oil Co., Lloyd Parker & Cosden Petroleum Corp.'s Maggie McNeill Est. 1, flowed 84 barrels from Hockley sand, Eocene 4437-45 feet, ¼-inch, 40.2-gravity, completed 7-4-54, TD 5720.

TEXAS—DISTRICT 2—NEW OIL PAY

Jackson County, Cordele, Southeast field. Bright & Schiff's Pressley 1, Peter White Survey, flowed 49 barrels oil and 1 barrel water from Catahoula sand, Oligocene 2740-42 feet, 12/64-inch, 21-gravity, completed 7-24-54, TD 2785.

TEXAS—DISTRICT 2—NEW DISTILLATE FIELDS

Dewitt County. Kirkwood & Co.'s A. J. Doehrmann 1, Patrick Quinn Survey, flowed 225 barrels distillate and 5.6 million from Wilcox sand, Eocene 8234-39 and 8241-48 feet, 52-gravity, completed 7-21-54, TD 8752.

Lavaca County, Chocolate Creek field. Atlantic Refining Co.'s H. E. Neuhaus, et al 1, Bridges Survey, flowed 155 distillate and 6.0 million from Wilcox "C" sand, Eocene 9136-9238 feet, 51.1-gravity, completed 7-1-54, TD 10,005.

TEXAS—DISTRICT 2—NEW DISTILLATE PAY

Goliad County, Dial field. Amerada Petroleum Corp.'s Mrs. Ada McFaddin et al 3, Pedro Trevino Survey, flowed 775 barrels distillate and 20.0 million from Wilcox sand, Eocene 9246-52 feet, 50.9-gravity, completed 6-10-54, TD 11,025.

TEXAS—DISTRICT 2—NEW GAS FIELDS

Jackson County. Brazos O&G Co. & J. P. Petkas' A. J. Scott et al 1, S. C. A. Rogers Survey, flowed 100 barrels distillate and 126.3 million from Frio sand, Oligocene 5514-24 feet, open, 41.3-gravity, completed 7-8-54, TD 6084.

Unnamed field. N. B. Hunt's O. B. Fenner 1, I&GN RR Co. Survey, flowed

10.5 million from Greta sand, Oligocene 2854-60 feet, open, completed 7-13-54, TD 4844.

Victoria County. Magnolia's Keeran Ranch 2-A, Martin De Leon Survey, flowed 4.5 million from 3356-61 and 3363-64 feet, open, completed 7-15-54, TD 8600.

TEXAS—DISTRICT 2—NEW GAS PAY

Jackson County, Horseshoe Lake field. Magnolia's J. H. Robinson 2-B, Jessie Wilson Survey, flowed 5.0 million from 3766-72 feet, open, completed 7-8-54, TD 4819.

TEXAS—DISTRICT 3—NEW OIL FIELDS

Harris County. H. E. Williams' George B. Adams 1, M. Tejerine Survey, flowed 120 barrels from Cockfield sand, Eocene 5573-74 feet, 7/64-inch, 40-gravity, completed 7-10-54, TD 5575.

"Clear Lake, South" field. Humble's Humble-West Fee 1-E, Sarah Deel Survey, flowed 17 barrels from Lower Frio sand, Oligocene 9108-23 feet, ⅛-inch, 26.2-gravity, completed 6-28-54, TD 10,584.

Matagorda County, Sugar Valley field. Brewster-Bartle Drilling Co., Inc.'s D. H. Braman 1, Amos Rawls League, ½-mile west extension, flowed 100 barrels from Frio sand, Oligocene 8998-9002 feet, 9/64-inch, 33.6-gravity, completed 7-1-54, TD 9070.

TEXAS—DISTRICT 3—NEW OIL PAYS

Brazoria County, Liverpool field. Ada Oil Co.'s Todd Unit 1, Angier, Hall & Bradley Survey, flowed 216 barrels from 10,240-248 feet, 9/64-inch, 37-gravity, completed 7-30-54, TD 10,885.

Stratton Ridge, South field. E. Cockrell, Jr.'s F. A. Brock 6-A, S. F. Austin ½ League, flowed 91 barrels from "Het Reef" sand, Oligocene 5495-5500 feet, 9/64-inch, 27.1-gravity, completed 7-3-54, TD 5674.

Jefferson County, Big Hill, West field. Deep South Oil Co. of Texas' Security Bank 13, T&NO Survey, Section 175, flowed 245 barrels from Marginulina sand, Oligocene 9106-10 feet, 31.2-gravity, completed 7-31-54, TD 10,484.

Liberty County, Hankamer-Fault Block 1. Dan J. Harrison, Jr.'s "A" Fee 8, H&TC RR Survey 3, flowed 152 barrels from 4304-21 feet, 11/64-inch, 25.6-gravity, completed 7-25-54, TD 4702.

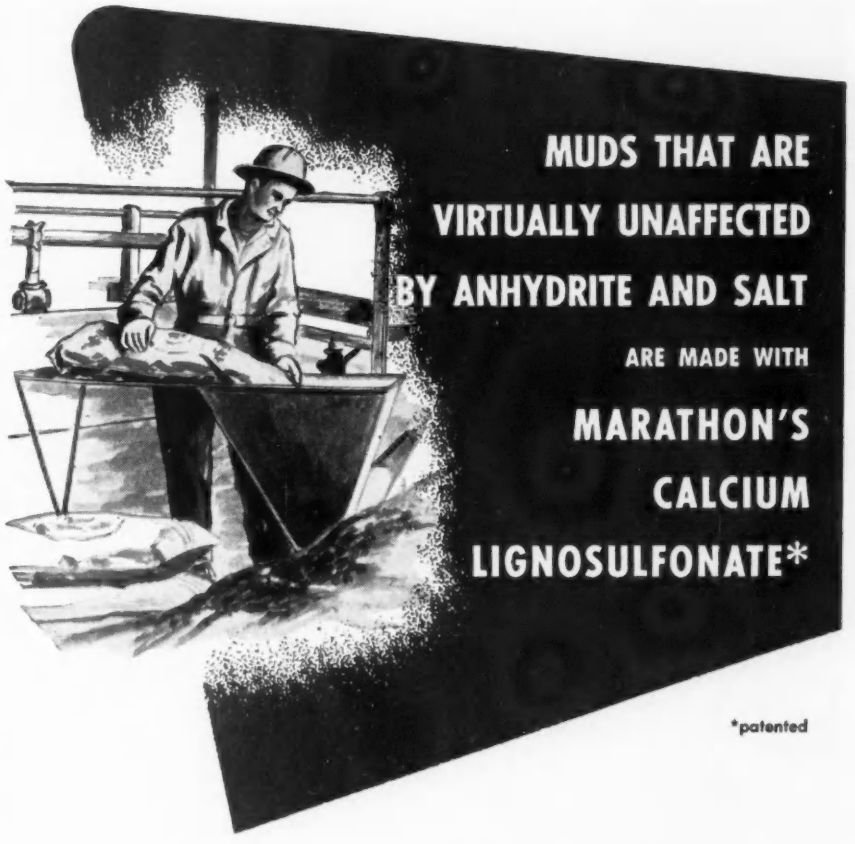
Matagorda County, Lucky field. J. M. Huber Corp.'s J. E. Thompson et al 1, Elisha Hall Survey, flowed 142 barrels from Badough (Frio) sand, Oligocene 8448-62 feet, 9/64-inch, 40-gravity, completed 7-3-54, TD 10,510.

Wharton County, Boling field. Mitchel T. Halbouty's Gary-Hogg 2, S. F. Austin League, flowed 104 barrels from "Het" lime, Oligocene 3292-3310 feet, 10/64-inch, 30-gravity, completed 7-26-54, TD 3362.

TEXAS—DISTRICT 3—NEW DISTILLATE FIELDS

Chambers County, "Round Point" field. Sun's Jackson-Nolte 1, I&GN RR Survey, flowed 520 barrels distillate and 45.0 million from Lower Frio sand, Oligocene 8815-25 feet, 47.2-gravity, completed 7-23-54, TD 9400.

Wharton County, "Harfst" field. Claud B. Hamill's G. H. Harfst 1, W. S. Delaney Survey, flowed 145 barrels distillate and 10.0 million from Yegua sand, Eocene



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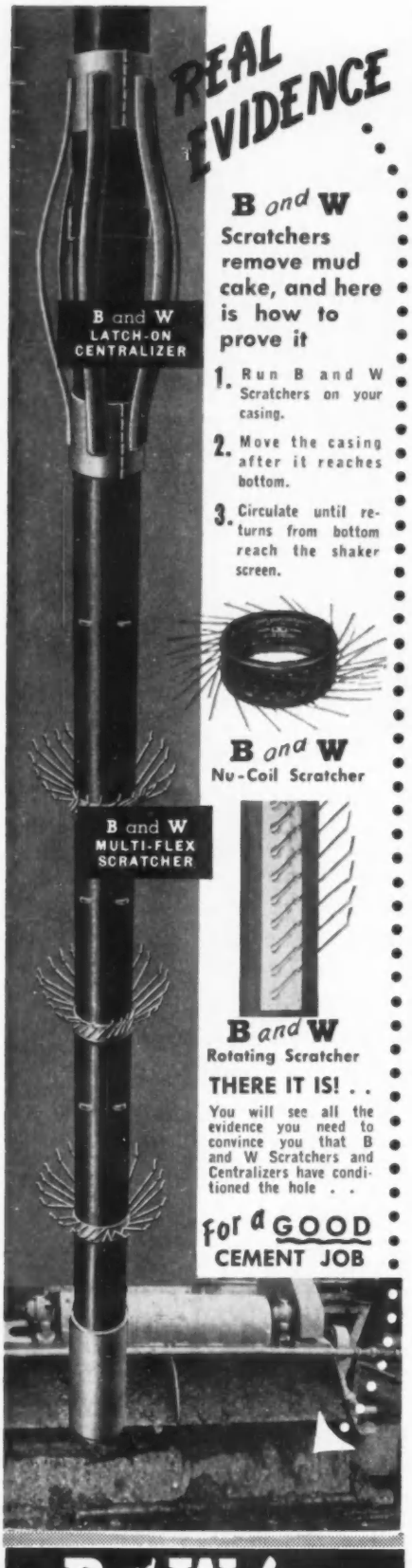
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6411-15 feet, open, 59.7-gravity, completed 6-15-54, TD 7070.

TEXAS—DISTRICT 3—NEW DISTILLATE PAYS

Brazoria County, "South Alvin" field. Dillard & Waltermire Drilling Co. & Alfred C. Glassell, Jr.'s M. A. Oliver 1, HT&B RR Survey, flowed 662 barrels distillate and 15.0 million from Frio (Anomalina) sand, Oligocene 10,153-158 feet, completed 7-17-54, TD 10,637.

Colorado County, Kennelly field. C. H. Osmond, Hill & Hill & A. W. Cherry's J. F. Frnka Unit 1, Sam Kennelly League, flowed 189 barrels distillate and 16.0 million from Cockfield sand, Eocene 6422-6426 feet, open, 52.5-gravity, completed 7-21-54, TD 10,019.

Matagorda County, Kain field. Union Producing Co.'s State Tract #100-East Matagorda Bay 1, in Matagorda Bay, flowed 21 barrels distillate and 10.6 million from Miocene sand, Miocene, 6647-53 feet, open, 60-gravity, completed 7-9-54, TD 6836.

Wharton County, Hutchins, Southwest field. Progress Petroleum Co. of Texas' Guy F. Stovall 1, G. W. Reynolds Survey #2, flowed 135 barrels distillate and 22.8 million from Frio sand, Oligocene 5484-87 feet, 44.5-gravity.

TEXAS—DISTRICT 3—NEW GAS PAY

Brazoria County, Stratton Ridge field. E. Cockrell, Jr.'s F. A. Brock A-4, S. F. Austin ½ League, flowed 23.8 million from Siphonina sand, Miocene 5965-75 feet, open, completed 1-3-54, TD 6346.

TEXAS—DISTRICT 4—NEW OIL FIELD

Willacy County, "La Sara" field. The Superior Oil Co.'s Ytuarria Cattle Co. 1, San Juan De Carricitos Grant, flowed 120 barrels from Upper Frio sand, Oligocene 6028-34 feet, 17/128-inch, 41.7-gravity, completed 6-30-54, TD 12,016.

TEXAS—DISTRICT 4—NEW OIL PAYS

Jim Wells County, Magnolia City, North field. Smith, De Lange & Progress' W. H. Evetts et al 1-A, Adams-Staples Subdn., Magnolia Fig Orchard Colony Block 2, flowed 82 barrels oil and 9 barrels water from Frio sand, Oligocene 4272-82 feet, 8/64-inch, 21.6-gravity, completed 7-9-54, TD 6000.

"North Alice" field. W. Earl Rowe's Leonor Perez 2, La Tinaja De Lara Grant, flowed 122 barrels from Stillwell sand, Eocene 5279-82 feet, ⅛-inch, 48.6-gravity, completed 7-3-54, TD 5400.

San Patricio County, East White Point field. Southwestern O&R Co.'s Malone-Sharp Unit 1, George H. Paul Subdn., Coleman Fulton Pasture Co. Land, Section 50, flowed 146 barrels from Frio sand, Oligocene 6388-90 feet, 10/64-inch, 43-gravity, completed 7-18-54, TD 7012.

Section # 2 field. Superior's Minnie S. Welder 2-3, C. J. Francisco and E. Portilla Survey, flowed 2 barrels oil and 2 barrels water from 5570-73 feet, 33.8-gravity, completed 5-8-54, TD 8175.

TEXAS—DISTRICT 4—NEW DISTILLATE FIELDS

Aransas County, "East Aransas Pass" field. The Atlantic Refining Co.'s R. R. Barber 1, John H. Phillips Survey, flowed 55 barrels distillate and 2.8 million from Marginulina "A" sand, Oligocene 7014-22 and 7032-36 feet, 59.7-

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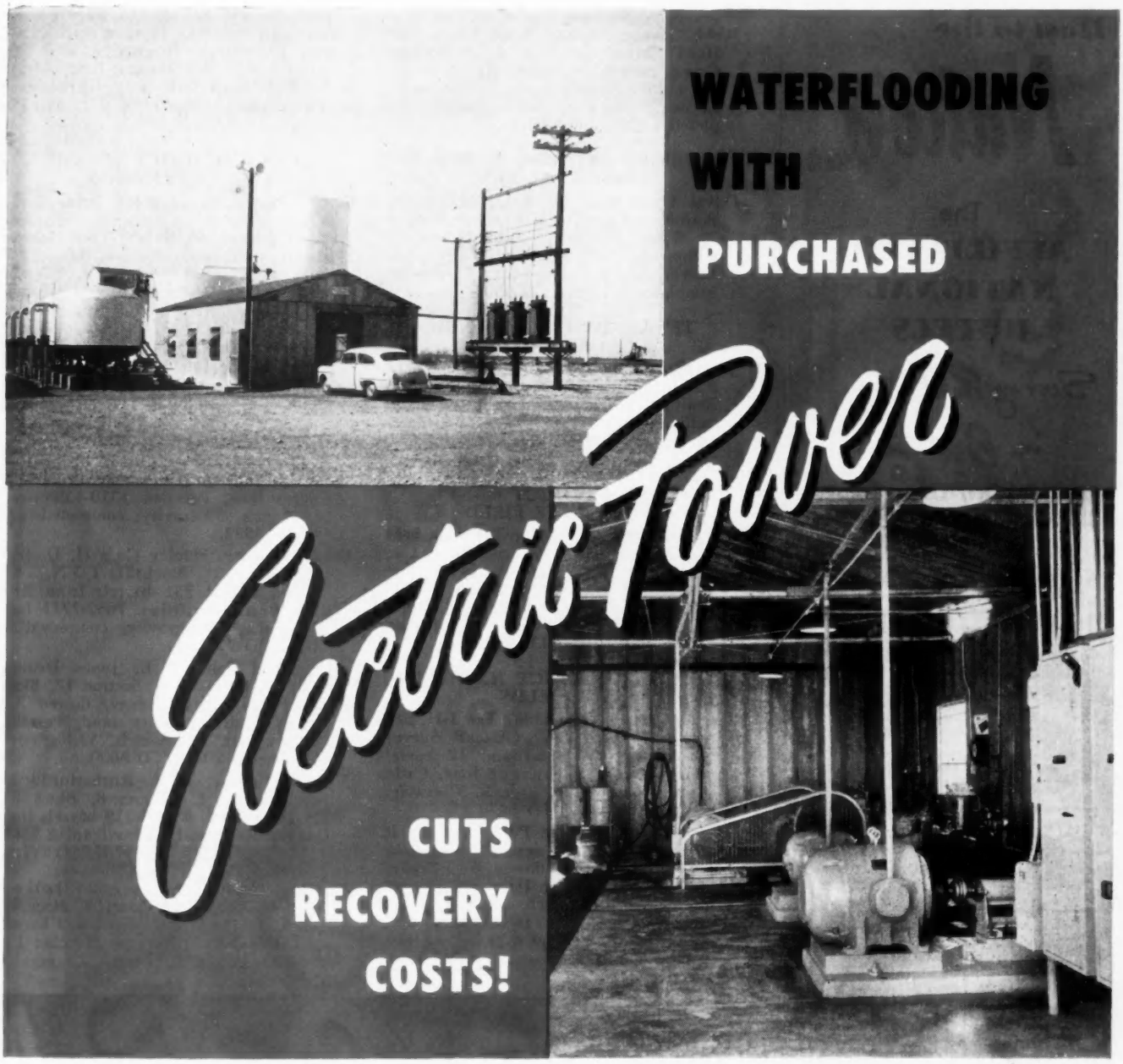

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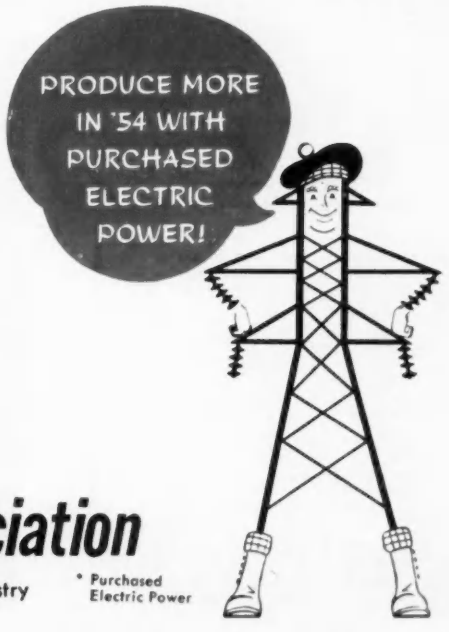

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gravity, completed 7-1-54, TD 10,000.

Webb County, "Reiser" field. Killam and Hurd's Bruni Estate 2, J. V. Borrego Grant, flowed 75 barrels distillate and 9.2 million from Upper Wilcox sand, Eocene 5125-28 feet, 58.8-gravity, completed 7-2-54, TD 5353.

TEXAS—DISTRICT 4—NEW DISTILLATE PAY

Duval County, "79" field. Magnolia Petroleum Co.'s Duval Ranch 9, Section 79, flowed 18 barrels distillate and 1.4 million from Upper Wilcox sand, Eocene 6991-7020 feet, 57-gravity, completed 6-17-54, TD 9503.

TEXAS—DISTRICT 4—NEW GAS PAY

Jim Wells County, Rand Morgan field. Rand Morgan's Rand Morgan R-5, Benito Lopez de Jean Grant flowed 1.5 million from Vicksburg-Lou Ella sand, Oligocene 5628-38 feet, completed 7-16-54, TD 5780.

TEXAS—DISTRICT 6—NEW DISTILLATE FIELD

Cherokee County, Jacksonville, West field. Eugene Talbert's P. G. Lake, Inc.'s Carl O. Nyman et al 1, John Moffatt Survey, flowed 64 barrels distillate and 8.0 million from Sub Clarkville sand, Upper Cretaceous 4572-74 feet, 67.6-gravity, completed 7-29-54, TD 4900.

TEXAS—DISTRICT 7C—NEW OIL FIELDS

Crockett County. Humble's Fee 1-H, Section 57, Block UV, GC&SF Survey, flowed 88 barrels oil and 12 barrels water from Ellenburger lime, Ordovician 6930-50 feet, ½-inch, 37-gravity, completed 7-3-54, TD 6970.

Unnamed field. The Pure Oil Co.'s R. L. Vaughn 35, Section 82, Block OP, GC&SF Survey, flowed 480 barrels from Ellenburger lime, Ordovician 7706-92 feet, ¾-inch, 42.1-gravity, completed 4-24-54, TD 7850.

Upton County, "Texel" field. Gulf's TXL 1-AE, Section 31, Block 42, T-5-S, T&P Survey, flowed 246 barrels from Devonian lime, Devonian 11,140-200 feet, 18/64-inch, 52-gravity, and 338 barrels from Ellenburger lime, Ordovician 12,245-330 feet, 10/64-inch, 52.2-gravity, completed 4-20-54, TD 12,501.

TEXAS—DISTRICT 7C—OIL FIELD EXTENSION

Ector County, Goldsmith field. Cities Service Oil Co.'s Cummings 2-K, Section 10, Block 45, T-1-N, T&P Survey, ½-mile northeast extension, flowed 194 barrels from Fusselman lime, Silurian 7945-74 feet, ½-inch, 42-gravity, and 790 barrels from Ellenburger lime, Ordovician 9097-9124 feet, ¾-inch, 43-gravity, completed 6-29-54, TD 9124.

TEXAS—DISTRICT 8—NEW OIL FIELDS

Andrews County. F. Kirk Johnson's A. W. Patillos 1, Section 22, Block A-36, PSL Survey, flowed 104 barrels from San Andres lime, Permian 4370-4593 feet, 11/64-inch, 30-gravity, completed 7-5-54, TD 4593.

Borden County. Hanley Co.'s H. D. Beal 1-B, Section 23, Block 31, T-3-N, T&P Survey, flowed 231 barrels from Reef lime, Pennsylvanian 7652-7711 feet, 28-64-inch, 40.7-gravity, completed 7-24-54, TD 7711.

Unnamed field. J. E. Jones Drilling Co.'s W. L. Miller 3, Section 12, Block 33, T-4-N, T&P Survey, flowed 329 barrels from Spraberry sand, Permian 7126-62 feet, 22/64-inch, 39.4-gravity, completed 6-20-54, TD 8800.

Howard County. P. R. Rutherford's Ed J. Carpenter 1, Section 8, Block 25, H&TC Survey, flowed 119 barrels from Canyon Reef sand, Pennsylvanian 7588-7608 feet, 10/64-inch, 45.5-gravity, completed 7-3-54, TD 7608.

Midland County. Warren Petroleum Corp.'s TXL 2-G, Section 39, Block 41, T-3-S, T&P Survey, flowed 849 barrels from Ellenburger lime, Ordovician 13,292-400 feet, 48/64-inch, 52.6-gravity,

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completed 7-12-54, TD 13,400.

Runnels County. Thomas G. Shields' Hoffman 1, R. S. Hamilton Survey #3, flowed 430 barrels from Scratt sand, Pennsylvanian 2203-07 feet, 17/64-inch, 45-gravity, completed 7-17-54, TD 3955.

Ward County. Humble's State University "AC" 1, Section 28, Block 18, University Lands Survey pumped 107 barrels oil and 50 barrels water from Delaware sand, Permian 5136-46 feet, 36.7-gravity, completed 7-2-54, TD 5397.

Yoakum County. Amerada Petroleum Corp.'s L. B. Tannehill et al 2, Section 904, Block D, John H. Gibson Survey, flowed 540 barrels from Wichita-Albany lime, Permian 8965-77 feet, 2⅜-inch, 52.4-gravity, completed 7-9-54, TD 11,530.

TEXAS—DISTRICT 8—NEW OIL PAYS

Andrews County. Woodley Petroleum Co.'s J. E. Parker 1-C, Section 1, Block A-43, PSL Survey, flowed 830 barrels from Pennsylvanian sand, Pennsylvanian 9095-9113 feet, 20/64-inch, 39-gravity, completed 7-12-54, TD 9310.

Block 5 field. The Texas Co.'s State of Texas 1-AU, Section 22, Block 5, University Lands Survey, flowed 400 barrels oil and 102 barrels water from Ellenburger lime, Ordovician 13,800-805 feet, 20/64-inch, 44.3-gravity, completed 7-15-54, TD 13,870.

Parker field. Fred Turner, Jr., et al's J. E. Parker 2, Section 19, Block A-44, PSL Survey 1980, flowed 1150 barrels from Pennsylvanian sand, Pennsylvanian 9088-9103 feet, ¾-inch, 41.6-gravity, completed 7-14-54, TD 9103.

Cochran County, Unnamed field. Ralph Abbey et al's Reed-Starnes 1, Section 57, Harrison & Brown Survey, pumped 210 barrels oil and 76 barrels water from Sand Andres lime, Permian 5008-49 feet, 30.5-gravity, completed 7-3-54, TD 5049.

Ector County, Cowden, South field. Cities Service et al's TXL 1-K, Section 5, Block 43, T-3-S, T&P Survey, flowed 1187 barrels from Ellenburger lime, Ordovician 12,883-908 feet, 21/64-inch, 51.6-gravity, completed 3-27-54, TD 12,916.

Goldsmith, East field. Forest Oil Corp.'s Blakeney 1-H, Section 30, Block 43, T-1-N, T&P Survey, flowed 164 barrels oil and 2 barrels water from Holt lime, Permian 4988-5085 feet, ¼-inch, 38-gravity, completed 7-8-54, TD 5085.

Howard County, Sara-Mag field. Russell Maguire's Barr 1, Section 14, Block 25, H&TC Survey, flowed 319 barrels oil and 13 barrels water from Palo Pinto lime, Pennsylvanian 7961-66 feet, 15/64-inch, 39.6-gravity, completed 6-28-54, TD 8033.

TEXAS—DISTRICT 8—OIL FIELD EXTENSIONS

Andrews County, Deep Rock field. Ralph Lowe's Southland Royalty Co., et al 1, Section 21, Block A-46, PSL Survey, 1¾-mile south extension, flowed 3264 barrels from Ellenburger lime, Ordovician 12,175-230 feet, ¾-inch, 43.8-gravity, completed 6-28-54, TD 12,394.

Borden County, Pancho-Mag field. Russell Maguire's H. D. Beal 1-A, Section 5, Block 27, H&TC Survey, ½-mile southwest extension, flowed 155 barrels from Pennsylvanian sand, Pennsylvanian 7550-60 feet, 15/64-inch, 44.5-gravity, completed 7-10-54, TD 7607.

Cochran County, Unnamed field. Ralph J. Abbey et al's Reed-Starnes 2, Section 58, Harrison & Brown Survey, ½-mile north extension, pumped 149 barrels oil and 18 barrels water from San Andres lime, Permian 4999-5032 feet, 30.5-gravity, completed 7-9-54, TD 5032.

Midland County, Virey field. Warren's Emma D. Gray 1, Section 27, Block 41, T-3-S, T&P Survey, ½-mile southwest extension, flowed 1379 barrels from Pennsylvanian sand, Pennsylvanian 10,660-720 feet, 24/64-inch, 30-gravity, completed 6-27-54, TD 10,720.

Mitchell County, Coleman Ranch, North field. Paul De Cleva's Howard Rogers 1, Section 86, Block 97, H&TC Survey, 1-mile northwest extension, pumped 118 barrels from Clearfork lime, Permian 3026-43 feet, 2-inch, 27-gravity, completed 7-18-54, TD 3043.

TEXAS—DISTRICT 8—DISTILLATE FIELD EXTENSION

Pecos County, Buckett field. Phillips' Odom 1-C, Section 24, Block 101, TCRR Survey, ¾-mile northeast extension, flowed 47 barrels distillate and 47.0 million from Ellenburger lime, Ordovician 14,248-774 feet, 2-inch, 52-gravity, completed 6-18-54, TD 14,774.

TEXAS—DISTRICT 10—NEW OIL PAY

Hansford County, East Gruver field. Humble's Caroline Crowe (#1 Gruver Gas Unit #4) 1, Section 107, Block 45, H&TC Survey, pumped 19 barrels from Kathryn sand, Pennsylvanian 6185-6205 feet, 36.6-gravity, completed 5-13-54, TD 6370.

TEXAS—DISTRICT 10—NEW GAS FIELD

Ochiltree County. The Texas Co.'s Sophie Pearson Daniel 1-A, Section 139, Block 4-T, T&NO Survey, flowed 4.4 million from Atoka sand, Pennsylvanian 7343-51 feet and 10 barrels distillate and 4.8 million from Morrow sand, Pennsylvanian 7551-60 feet completed 7-1-54, TD 10,181.

TEXAS—DISTRICT 10—NEW GAS PAY

Hansford County, Hugoton field. United Production Co.'s Lola Jackson 4, Section 19, Block 2, SA&MG Survey 2310, flowed 14.1 million from Morrow sand, Pennsylvanian 6586-6606 feet, completed 7-22-54, TD 7254.

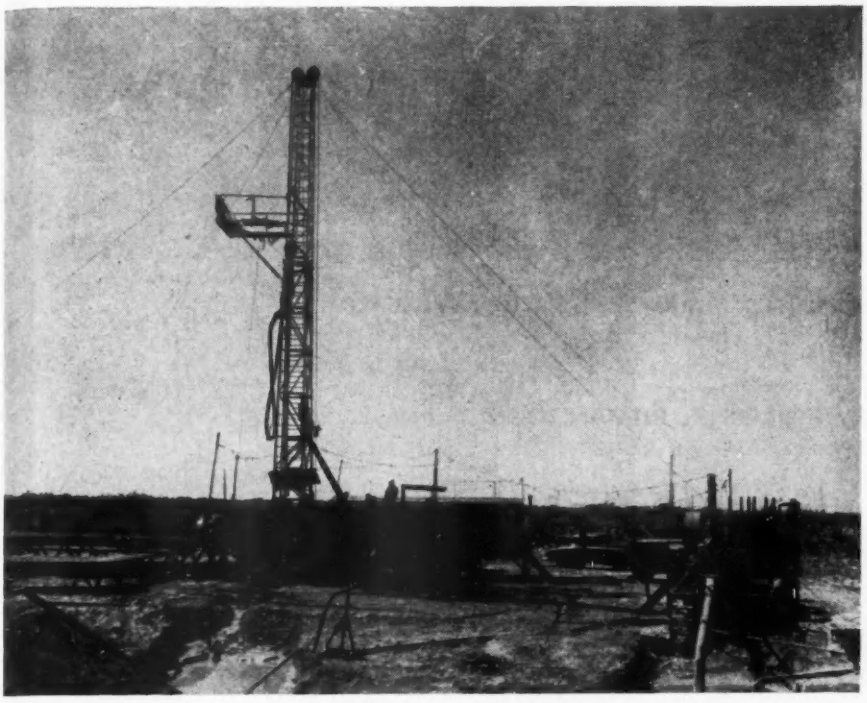
UTAH—NEW GAS FIELD

Grand County. Burton W. Hancock's West Bar-X Unit 1, NE NW 21-17s-25e, flowed 3.1 million from Entrada sand, Jurassic 4080-4163 feet, completed 4-25-54, TD 4163.

WYOMING—NEW OIL FIELDS

Park County, Big Polecat area. Mule Creek Oil Co. and Farmers Union Central Exchange's Unit 1, C E/2 SE SW 16-57n-98w, pumped 470 barrels from Tensleep sand, Pennsylvanian 5362-78 and 5496-5512 feet, completed 7-31-54, TD 5572.

Weston County, Rochelle area. I. Pasternak's Field 1, C NW NE 11-42n-67w, flowed 768 barrels from Newcastle lime, Upper Cretaceous 7446-62 feet, completed 7-13-54, TD 7538.



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How Strat and Core Holes Compare With Slim Holes

Here's a cost comparison from a company that has drilled more than 5000 such holes for geologic information.

By VERNON THOMPSON
Thompson Exploration & Drilling Company, Lubbock, Texas

THOMPSON EXPLORATION COMPANY has drilled more than 5000 core holes, "strat" holes and slim holes for geologic information. Because of the similarity of these methods, a short discussion on core hole and strat hole is presented with a contractor's cost estimate for each method.

Core hole drilling is done for the purpose of looking for geologic reflection of structures in upper formations. Depths of core holes vary from 100 feet to 4400 feet, however, core drilling rately exceeds 3500 feet. The average depth is only 1200 feet.

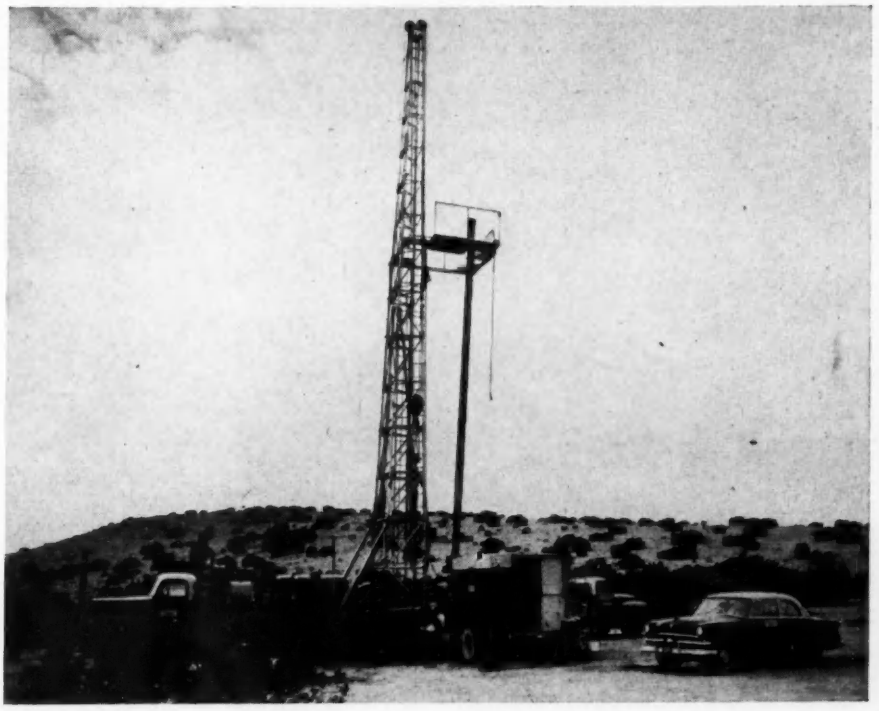
Most core hole drilling contractors use 4¾-inch bits for depths less than 1000 feet. 5⅝-inch bits are used for depths below 1000 feet and in some cases 6⅛ to 6¾-inch bits. The equipment is a conventional core rig with 5 by 8-inch pump capable of drilling to 2500 feet. In soft formations 2⅜-inch drill pipe is used. But in hard formations with thick salt sections, 2⅞-inch drill pipe is suggested. Pump pressures have never exceeded 400 pounds per square inch at 4000 feet.

Core hole drilling contracts are often turnkey jobs. Such contract jobs furnish an engineer to run elevations, drilling muds, electrical logs, bits, etc. These costs vary widely but approximately run from:

- $1.30 to $2 per foot in Southern Alabama
- $3.50 to $5 per foot in West Texas hard formations
- $3.75 a foot in Williston Basin
- $1.50 per foot in Southern Mississippi
- $1.50 per foot in East Texas.

Strat hole drilling—an abbreviation for stratigraphic drilling—is done for the purpose of obtaining geologic information on the stratigraphy or paleontology. Information is obtained

Continued on Page 124



CORE HOLE DRILLING rarely exceeds 3500 feet. Equipment shown here is a conventional core rig with 5-by-8-inch mud pump. Telescoping mast accommodates doubles of exploration pipe.

The morning after the blowout.

Blowout!

The story of a wild well and how it was controlled despite wind and choppy water 7 kilometers offshore in Venezuela's Lake Maracaibo.

By MORRIS R. PITMAN, Chief Drilling Engineer,
Creole Petroleum Corporation, Caracas, Venezuela

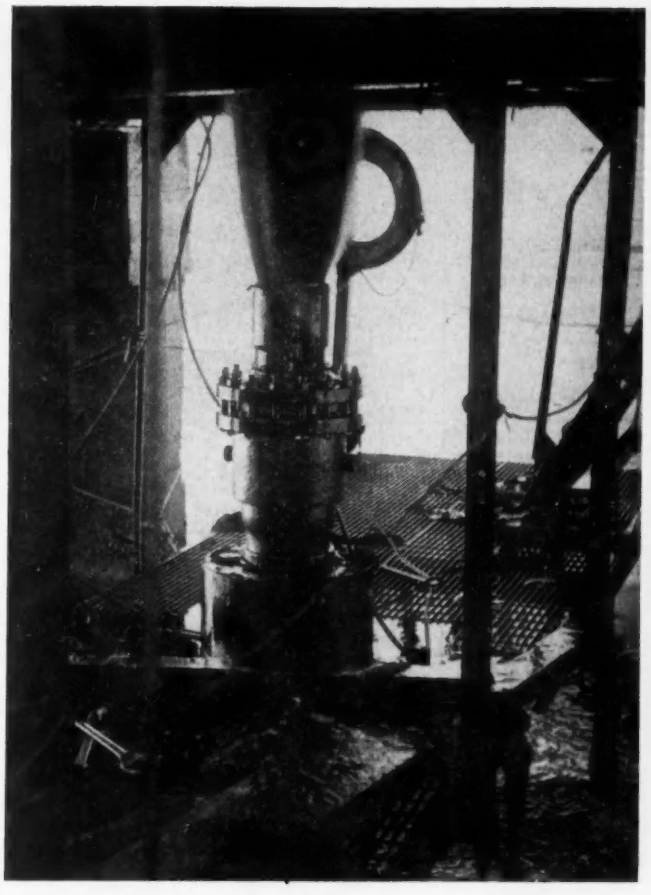
HERE'S A blow-by-blow description of a Creole Petroleum Corporation (Caracas) well which got out of control in January, 1954. The well is in Western Venezuela in the Tia Juana District where all of Creole's wells are located in water from 20 to 99 feet. TJ-187 is about 7½ kilometers from shore, in Lake Maracaibo. Depth of the water at this location is 48 feet. Well TJ-187 was on the well repair list for installation of a packer above the producing interval to relieve the pressure on the surface connections.

The well was completed in 1941 with an initial production of 1134 barrels per day; choke 3/8 inch; gas-oil ratio 492; and the latest production test was 1090 B/D; choke 3/8 inch; G.O.R. 513; tubing head pressure 360; casing head pressure 870; API gravity 26.5°. Total accumulated production was a little over 5 million barrels. Based on bottom-hole pressure information it was decided to use 15° gravity crude for killing the well and leaving in the annulus. This heavy crude provided 375 psi pressure in excess of bottom hole pressure.

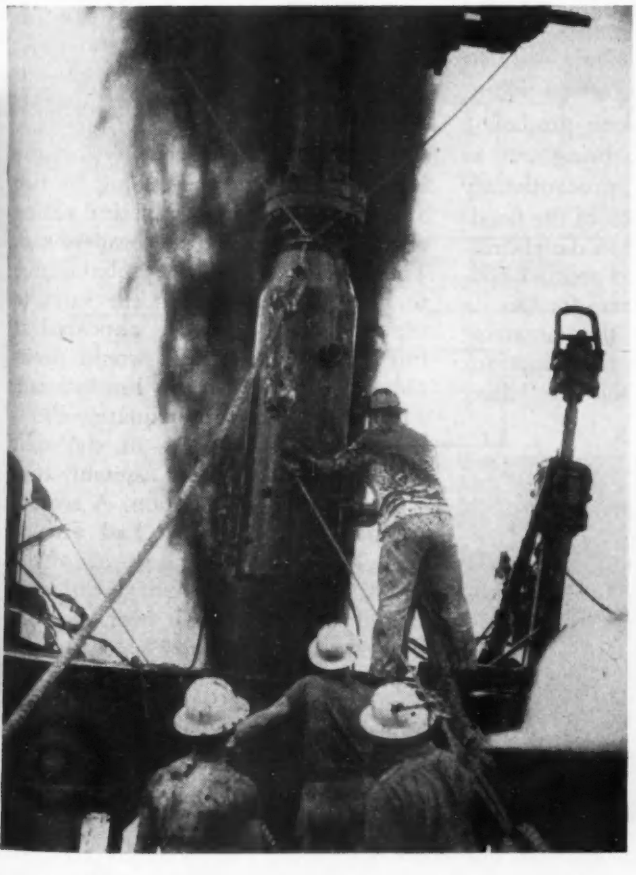
To prevent possible damage to the producing formation, it has been common practice in this area on workovers to use heavy oil instead of mud as a circulating fluid. The hole

Derrick is pulled over to provide room for installing control head and reduce danger of fire.

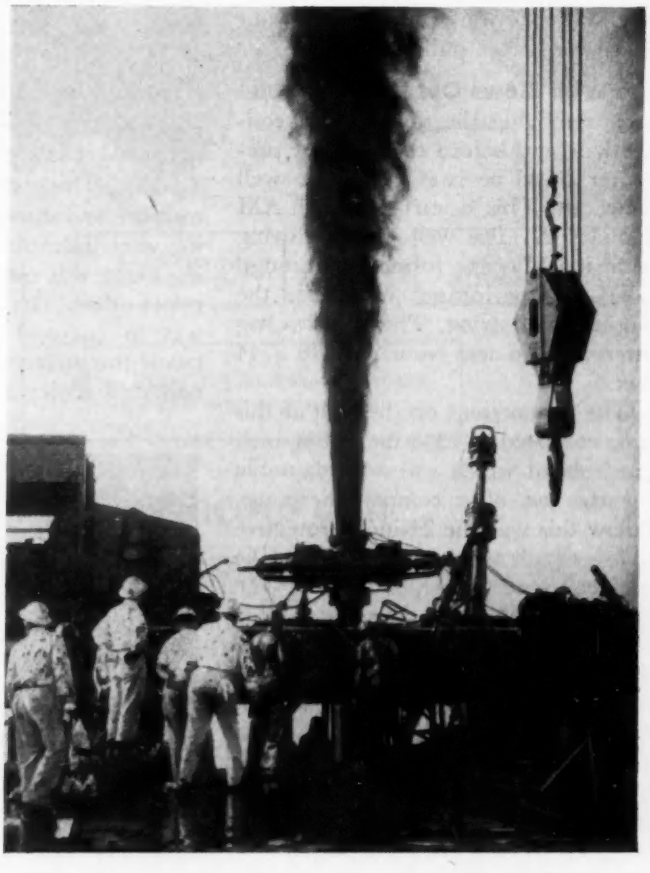
Crew installs split, lead-lined collar.



Wellhead after collar was installed.



Ready to snub first control head over well.



Control head is in place over well.

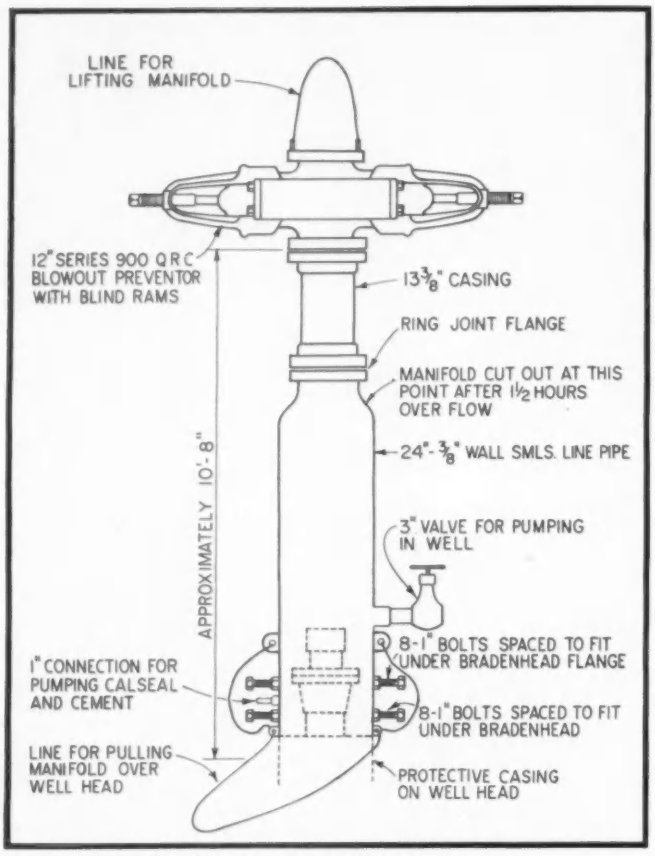

LINE FOR LIFTING MANIFOLD
12" SERIES 900 Q R C BLOWOUT PREVENTOR WITH BLIND RAMS
13 3/8" CASING
RING JOINT FLANGE
MANIFOLD CUT OUT AT THIS POINT AFTER 1½ HOURS OVER FLOW
24"-⅜" WALL SMLS. LINE PIPE
APPROXIMATELY 10'-8"
3" VALVE FOR PUMPING IN WELL
8-1" BOLTS SPACED TO FIT UNDER BRADENHEAD FLANGE
1" CONNECTION FOR PUMPING CALSEAL AND CEMENT
8-1" BOLTS SPACED TO FIT UNDER BRADENHEAD
LINE FOR PULLING MANIFOLD OVER WELL HEAD
PROTECTIVE CASING ON WELL HEAD

Fig. 1—First Control Manifold.

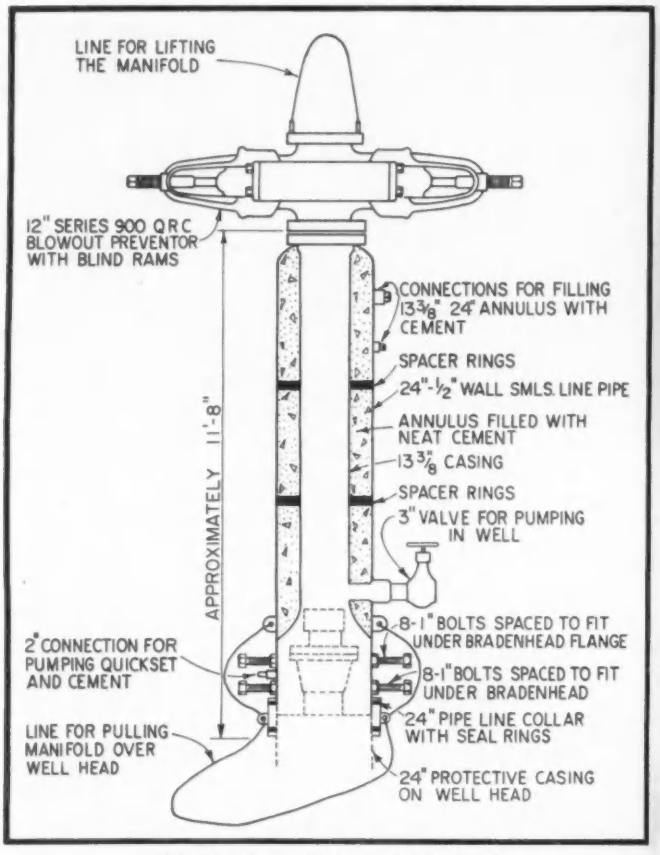

LINE FOR LIFTING THE MANIFOLD
12" SERIES 900 Q R C BLOWOUT PREVENTOR WITH BLIND RAMS
CONNECTIONS FOR FILLING 13 3/8" 24" ANNULUS WITH CEMENT
SPACER RINGS
24"-½" WALL SMLS. LINE PIPE
ANNULUS FILLED WITH NEAT CEMENT
13 3/8" CASING
SPACER RINGS
3" VALVE FOR PUMPING IN WELL
APPROXIMATELY 11'-8"
8-1" BOLTS SPACED TO FIT UNDER BRADENHEAD FLANGE
2" CONNECTION FOR PUMPING QUICKSET AND CEMENT
8-1" BOLTS SPACED TO FIT UNDER BRADENHEAD
24" PIPE LINE COLLAR WITH SEAL RINGS
LINE FOR PULLING MANIFOLD OVER WELL HEAD
24" PROTECTIVE CASING ON WELL HEAD

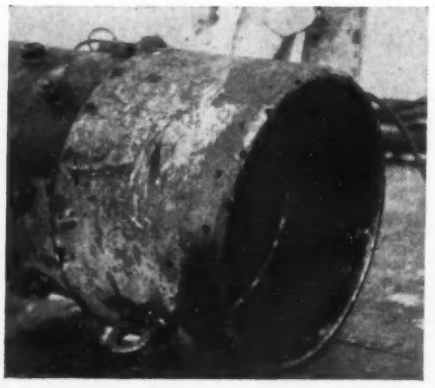
Fig. 2—Second Control Manifold.

was filled with 15° gravity crude and after the well became quiet the surface connections were removed in preparation for installing the blowout preventer before pulling tubing.

The Well Blows Out. In the interval after removing the tubing head connections and before the blowout preventer could be installed, the well blew out. This occurred at 1 AM January 27. The well was producing from the Miocene formation through a 6⅝-inch perforated liner set in the 8⅝-inch oil string. The producing interval open was from 3520 to 3744 feet.

The connections on the well at this time consisted of 13⅜-inch x 8⅝-inch bradenhead which was not adaptable for the use of a companion flange. Below this was the 24-inch protective string which was cemented from the surface to total depth or 113 feet. The 2½-inch tubing was hanging on the elevators and oil was blowing through the tubing, and annulus. Work was started immediately building a split ring joint flange to install below the 8⅝-inch casing collar on the wellhead. A 13⅜-inch nipple with companion flange and valve would then be secured to the split flange for capping the well.

Water Pumped in Offset Well. As additional measures for controlling the well, two diesel workover barges were moved to a 600-meter up dip offset to TJ-187. This offset well was killed and both barges started pumping water into the same producing interval that was blowing out in TJ-187. This was a precautionary measure and since results of the flooding were indeterminate, a diesel drilling barge was moved to another 600-meter offset. The program for this rig was to cut and pull the oil string below the surface pipe, then sidetrack and drill a deviated hole for killing TJ-187. Outside technical help was contacted to assist in drilling the deviated well. The operation of all three of these rigs during each 24-hour period were shut down at times from oil spray due to changes in wind direction.



SPECIAL PIPE LINE collar that was placed on bottom of head.

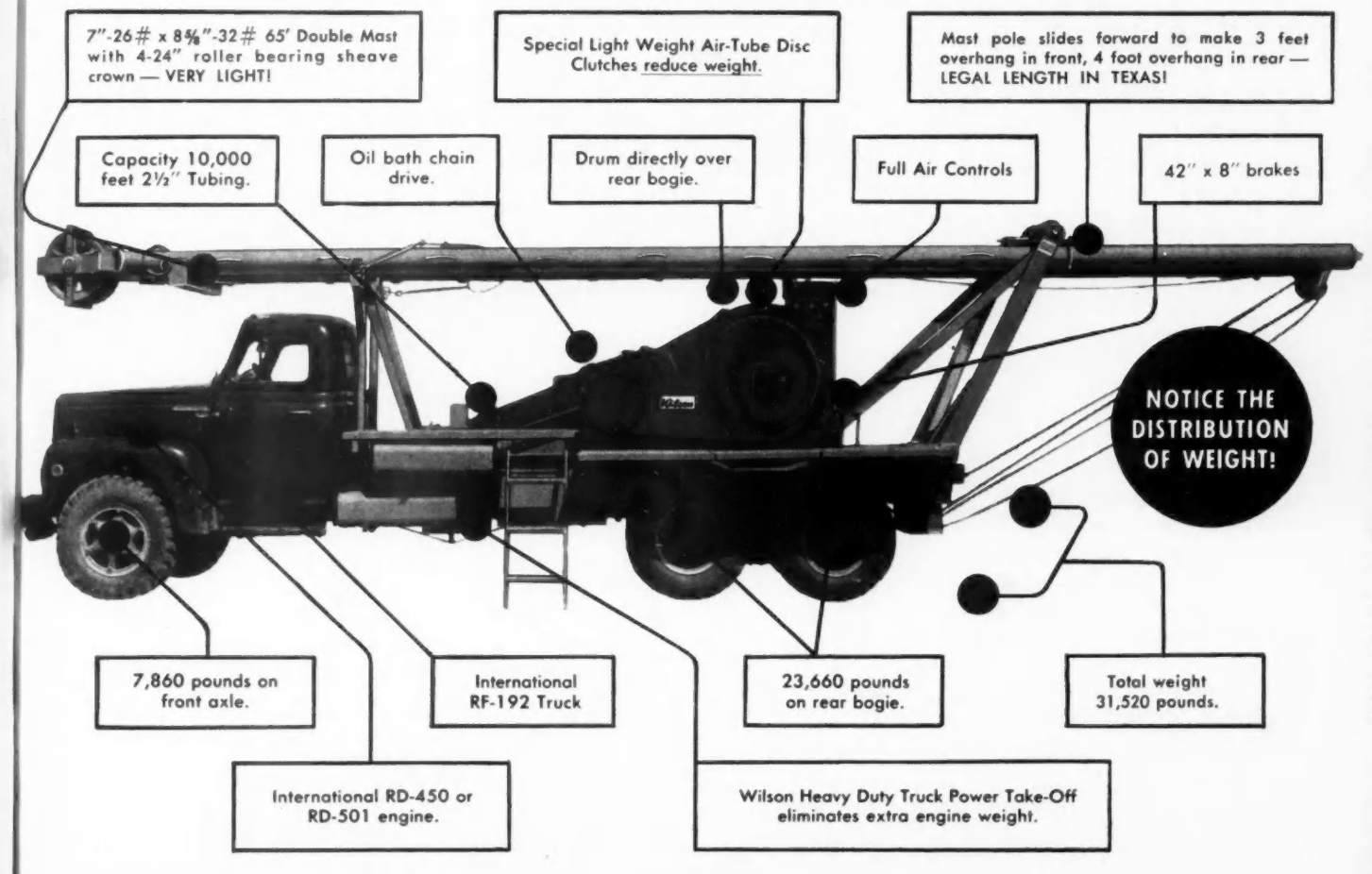
Sand Cutting A Hazard. By January 28, sand had cut the tubing in two and cut the 8⅝-inch collar and casing on one side down to the bradenhead. This cutting action was probably due to the tubing deflecting the sand to the side of the casing. It appeared at this time that the sand would probably cut through the bradenhead. This sand cutting unfortunately eliminated the possible use of the split flange, nipple and valve assembly that was ready for installation. A service company representative had arrived by this time and after a survey of the well it was decided that a control head should be built to pass over the bradenhead and tie to the 24-inch surface protective string.

Weather and Lake Complicate Problem. While the control head was being fabricated, a casing clamp was placed on the 24-inch protective casing and the wellhead was tied to the four foundation corners with turn-

WEIGHT— IS IMPORTANT
IN DEEP WELL SERVICING WINCHES

To conform with the legal weight, length and width set up by the individual states, WILSON has developed the Mogul "42." This winch is undoubtedly the most modern winch in the field and is rapidly gaining great popularity. This modern winch has been combined with the New Wilson Heavy Duty Truck POWER-TAKE-OFF and the new Wilson Masts to make a COMPLETE WELL SERVICING UNIT that meets all weight requirements.

LOOK AT THESE SPECIAL FEATURES


7"-26# x 8⅝"-32# 65' Double Mast with 4-24" roller bearing sheave crown — VERY LIGHT!
Special Light Weight Air-Tube Disc Clutches reduce weight.
Mast pole slides forward to make 3 feet overhang in front, 4 foot overhang in rear — LEGAL LENGTH IN TEXAS!
Capacity 10,000 feet 2½" Tubing.
Oil bath chain drive.
Drum directly over rear bogie.
Full Air Controls
42" x 8" brakes
NOTICE THE DISTRIBUTION OF WEIGHT!
7,860 pounds on front axle.
International RF-192 Truck
23,660 pounds on rear bogie.
Total weight 31,520 pounds.
International RD-450 or RD-501 engine.
Wilson Heavy Duty Truck Power Take-Off eliminates extra engine weight.

MOGUL "42" COMPLETE WELL SERVICING UNIT

DON'T BUY AN OBSOLETE WINCH— BE MODERN . . . BUY WILSON!

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The FIRST NAME in OIL FIELD WINCHES

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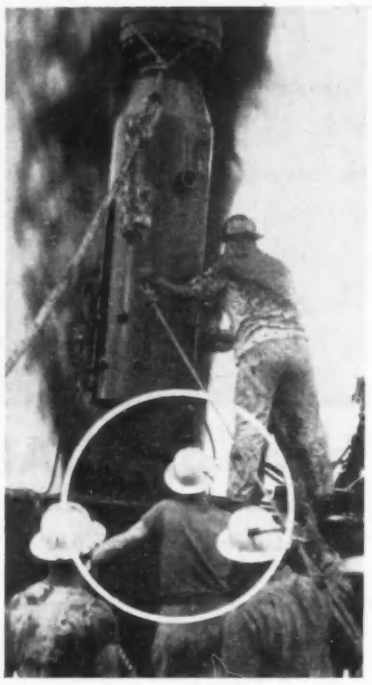
buckles. The bradenhead valves and connections were removed and replaced with short bull plugs to permit passing the control manifold over the bradenhead. Another casing clamp was installed on the 24-inch casing to be used for snubbing the head over the well. As an additional safety measure, three hundred sacks of cement were pumped into the 11¾-inch and 8⅝-inch casing annulus. During the cementing operation the lake became rough and the landing platform under the derrick was knocked down by one of the launches.

The morning of January 30 the control head and other equipment was loaded on a derrick barge and arrived at TJ-187 by 7 AM. The landing platform was repaired and some of the rig equipment removed from the derrick floor. The control head (see Figure 1) was picked up and an attempt made to put the manifold through the V-door of the derrick with the derrick barge crane. Due to the slight swells on the lake which caused the crane to swing, it was practically impossible to install the head through the V-door. During this operation, the wind changed making it necessary to move the derrick barge to the opposite side of the well foundation out of the oil spray. This switching of the derrick barge and other equipment was necessary at least twice each day and added to the difficulty of working on the well. The derrick barge and other units used were powered with diesel engines with special extended exhausts that discharged into the water to reduce fire hazards.

Derrick Is Pulled Over. It was decided by all concerned at this time that the derrick should be pulled over to provide room for installing the control head and reduce the possible danger from fire. To accomplish this, the anchor bolts from two derrick legs and the bolts from the braces of these legs to the first girt were removed. One anchor bolt was left in each of the other two derrick legs. A sling line about 300 feet long was tied to the two loose derrick legs. The derrick barge was backed up, pulling the loose derrick legs out, and the derrick fell leaving the floor clear. The remainder of January 30 was spent in rigging the control manifold with the proper lines to swing it over the flow.



About the Author

MORRIS R. PITMAN, chief drilling engineer for Creole Petroleum Corporation is a busy man. He dashed this story off over a weekend and then was back on the job. And not that he's camera shy, but probably the most appropriate picture of Pitman is the one above . . . on the scene at the ill-fated Well TJ-187. Pitman has been with Creole in Venezuela since 1939 and has served in all of Creole's production districts. A graduate of the University of Oklahoma with a degree in petroleum engineering, he joined Humble Oil & Refining Company's drilling department in 1932. He was with Humble seven years before joining Creole in Venezuela.

Flow Directed Upward. On January 31 the derrick barge and equipment was moved into the well at 7 AM. A lead-lined split collar had been made during the night to fit around the 8⅝-inch casing and collar on the wellhead. This was placed on the wellhead to keep the stream from coming out the vertical split in the 8⅝-inch collar, thus directing the flow upward and minimizing the cutting action on the control manifold.

Control Head Snubbed Over Well. The control head was picked up about 10 a.m., January 31 and snubbed over the well. The 1-inch studs were tightened to hold the manifold in place. A 24-inch clamp with rag packing was installed to shut off leaks between the manifold and the 24-inch protective casing. The derrick barge was moved to the windward side of the derrick as the wind changed and preparations were being made to pump quick-set and cement between the manifold and wellhead when sand cut through the manifold where the 24-inch swaged down to 13⅜ inches. The control manifold was in the flow about 1½ hours before cutting through. The quick-set and cement was to provide a pressure seal at the junction of the control head and 24-inch casing. Also, to set around the 16 1-inch studs and bradenhead to secure and hold the head or manifold on the well.

Special Collar Provides Seal. The control head was left on the well and plans were made to build a second head designed to withstand the cutting action of the flow. This control head consisted of a section of 24-inch casing with 13⅜-inch casing inside and cement in the annulus between the two sections. The details of this control head and its approximate position over the wellhead are shown in Figure 2. A 24-inch special pipe line collar was placed on the bottom of the head. This collar is made without threads but equipped with packing that can be expanded by tightening the screws on the end of the collar. The collar provided the seal needed and proved to be a deciding factor in making the control manifold a success.

While fabricating the second manifold, the old manifold was removed from the wellhead on the morning of February 1. The blowout preventer had been partly cut off by sand causing the flow to be divided and covering the area under the derrick floor. A catline was carried onto the location in a rowboat. The line was tied to the blowout preventer and to the crane of the derrick barge, which had remained in the clear back from the well. An attempt was made to lift the blowout preventer but the catline parted.

Preventer Successfully Removed. The derrick barge was then moved

SKIDDING A 350,000-LB. RIG 7/10 OF A MILE IN 20 MINUTES!

Using a brawny CAT* D8 Tractor, Heard & Heard, Inc., skidded a 350,000-lb. rig 3720 feet in 20 minutes in the Huff gas field near Refugio, Tex. With the D8 handling block-up operations, the rig was loaded on Athey Tracks in 2 hours and unloaded in 1½ hours!

Performances like this moved Jess Hill, truck pusher for Heard & Heard, to observe, "We standardized on Caterpillar-built Tractors because they are the best made, in my estimation."

Heard & Heard of Refugio operates four D8s, a D7, D6 and a No. 12 Motor Grader.

As costs continue to pyramid in the oil fields, you have to get full productive use of every minute. Time wasted is money lost. That's why the trend is toward standardizing on Caterpillar-built equipment. It builds profits because it saves time in so many ways.

A tractor like the D8 in the picture — equipped with No. 8S Bulldozer and Hyster Winch — is versatile. This is no "one-job prima donna." Besides moving rigs, it can dig or fill slush pits, level sites, dig gathering lines, dike storage tank areas. You'll never run out of work for it.

You can depend on it to be ready whenever the job beckons. There is long life built into all Caterpillar-built Tractors. Their hour meters — registering thousands of working hours — prove it.

So follow the lead of oil industry leaders. Standardize on Caterpillar units. You can start today *with a demonstration.* Call your Caterpillar Dealer. He'll be glad to show you the equipment you need on *your* job!

Caterpillar Tractor Co., Peoria, Ill., U.S.A.

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up to the foundation and a wire sling placed around the preventer. On picking up the preventer, it sheared loose from the 24-inch pipe but a flange caught under the rotary table beams. This strain broke the cable on the crane and the preventer dropped back on the wellhead. A second derrick barge was moved into position and the preventer was lifted off successfully. The 1-inch hold-down studs were removed and the 24-inch manifold nipple was snubbed from the wellhead with some difficulty.

On February 2, the derrick barge was moved to the location with the second control head arriving at 6:30 AM. The 24-inch snubbing clamp was placed on the wellhead and the turnbuckles guying the wellhead to the foundation were tightened. The second control head was picked up about 9 AM and snubbed over the wellhead. The 1-inch studs were tightened to hold the manifold in place over the wellhead. The seal rings and set screws in the pipe line collar were tightened and chain hoists were installed to assist in holding the manifold to the casing. A workover barge, which had been standing by, and a cement barge were moved in to kill the well. Two batches of quick-set and cement were mixed and pumped between the manifold and the wellhead. There was a strong vacuum between the wellhead and manifold, and little, if any, of the special quick-set cement mixture remained in place.

Oil A Constant Hazard. Before the blowout preventer could be closed, the wind changed so that oil was blowing back on the workover and cementing barges. The workover barge was covered with oil making it unsafe to use for killing the well. The cementing barge and a derrick barge were moved to the opposite side of the derrick, and it was decided to use only the cementing unit for killing the well. A mud barge was placed alongside the cementing barge to furnish mud for the operation.

Well Is Killed. The blowout preventer was closed at 12:30 PM, February 2. Upon closing the blowout preventer, the entire control manifold moved upward about 1-inch, bending the hold-down studs and causing numerous leaks. Fortunately, mica flakes had been mixed with the mud and this combination effectively sealed the leaks. The total upward force on the control manifold when the well was closed in was 130 tons. The well was killed with mud, maximum pump pressure 650 psi, then plugged with cement for abandonment due to the condition of the 8⅝-inch casing. The estimated producing rate of the well during the blowout was 6000 B/D.

The injection of water into the offset location was shut down and the well was swabbed back into production. This operation had not had time to have any effect on the wild well. At the time TJ-187 was capped, the other offset operation was preparing to set a whipstock at 602 feet to start the deviated hole. The program was changed and the well redrilled and completed as a producer.

Equipment Used. TJ-187 had been out of control 6½ days, during this period the following equipment and men were used in fighting the well:

Six passenger launches

Two fire boats

Two derrick barges

Two to three tugboats

One cement barge

Two work boats

Three workover barges

One drilling barge

One mud barge

25 to 50 men working at the well

One DC-3 plane standing by

8 to 15 men working nights in the shops on land.

Throughout this operation safety precautions were stressed to prevent fire and injuries to the men working around the well. The methods of handling equipment and each operation at the well was considered from a safe working viewpoint. The engine exhausts on the equipment were changed to discharge into the lake, all available non-sparking tools were used and no matches or lighters were carried by any of the workmen. These precautions brought results since there was no lost time injuries during the entire period. Considering all the difficulties of the job, such as: rough water, lack of working space, wind changes, fire hazards, etc., this entire operation was a job well done.

—The End

Strat and Core Holes

Continued from Page 117

by catching samples; running an electric or radioactivity log or a mud iog; sidewall cores, and a drillstem test in some instances. The size of well bore in strat holes depends upon the test to be run but most common bit sizes are from 6¾ inches to 4¾ inches.

Conventional small rigs capable of 5000 foot drilling with 3½-inch drill pipe or 7000 feet with 2⅞-inch drill pipe have been used. Pumps are 7 inches by 10 inches for 4000 to 5000 foot drilling. Mud pressures rarely exceed 600 pounds psi. Most drilling fluid used has a low viscosity. Air, water and mud have all been used as circulation media.

In Abalama, lost circulation is a major problem due to high porosity sand and other causes. In Florida, lost circulation is caused by porous limestones, high porosity gravels, and sands on the overburden. West Texas' Edwards Plateau region is noted for its lost circulation problem also and air often has been used to good advantage to prevent circulation problems and to increase penetration rates.

Cost of such geologic drilling is generally 25 percent less than conventional drilling methods in a given area. Most of the saving is attributed to the size of the hole, equipment, and the fast moves, coupled with labor savings.

Drill pipe used is exploration pipe which comes in sizes 2⅜, 2⅞, and 3½ inches and measures 20 feet and 6 inches long. Thirty-foot joints are available in the latter two sizes.

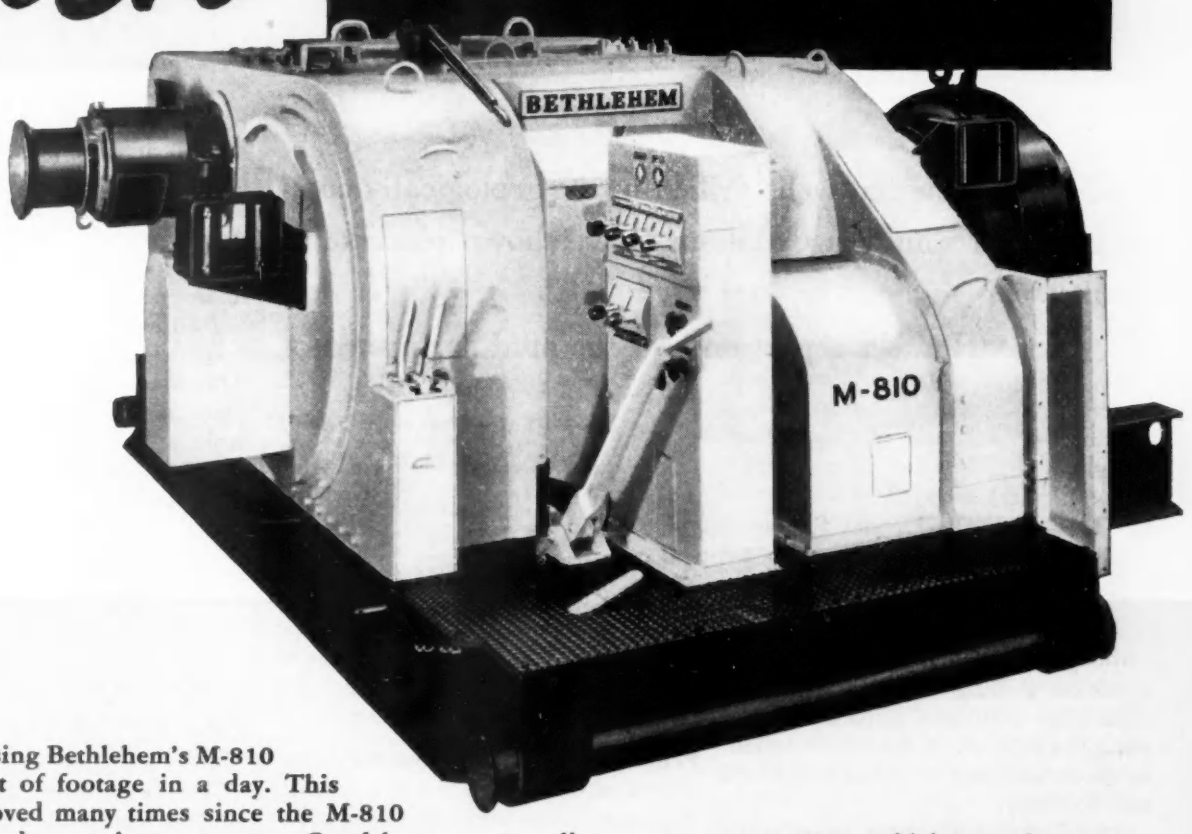
A major problem is the size of the hole to work in. Difficult fishing problems have been experienced, but in only a few instances have drill collars been "planted" in the formation. Fishing is routine with conventional equipment currently available. Risk must be anticipated.

Seven or eight drill collars in 6¾ and 5⅜-inch hole are used. On smaller diameter holes, 3-inch flush joint drill collars are used. The deviation problems are approximately the same, whether in slim hole or in a conventional hole.

Thompson Exploration Company's operations spread from Florida to the Rockies. Most drilling has been comparatively shallow and in wildcat territories. No wells have been completed.

—The End

The M-810 makes hole fast



A hook-up using Bethlehem's M-810 can log a lot of footage in a day. This has been proved many times since the M-810 was introduced more than a year ago. Careful comparisons have shown that there is no finer rig built in the medium-heavy drilling class.

The M-810 is soundly engineered to combine all the features needed for speed and durability. Features that keep it in action so that the job can be pushed ahead fast.

Here, for example, is a rig with tremendous clutch capacity (low-speed drum clutch, 102,000 ft-lb). It is equipped with extra-powerful 52-in. brakes. It can be furnished with two- or three-engine drive having single or double pump drive, the pump drive being Airflex-clutch-controlled. Engine compound and drawworks transmission clutches are of disengaging spline type; master and high- and low-speed drum-drive clutches are air-actuated friction type.

You have your choice of mechanical drive, fluid coupling, or torque-converter—whichever suits your needs.

And don't overlook this very good point: the M-810 is an easy rig to move, for the engine compound is sectionalized, and the overall width of the drawworks is well within required road limits.

Our engineers would like to tell you more about this powerful rig. Then, if you'd like to see it in action, a trip to the field can easily be arranged.

Optional Feature

Whenever desired, the M-810 can be furnished with an upper drum to facilitate coring and bailing work.

BETHLEHEM STEEL

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Special Oil Emulsion Mud Is Reducing Drilling Costs

• Thirteen wells drilled in the geologically complex area of southern Oklahoma have shown remarkable results.

• Here's a report on how the mud performed.

By R. S. BAKER, District Engineer,
Drilling Specialties, Inc., Corpus Christi, Texas

THE USE OF a specially prepared carboxymethylcellulose (CMC) oil emulsion drilling fluid in 13 wells drilled by Phillips Petroleum Company in Southern Oklahoma, resulted in an outstanding record of efficiency and economy.

The wells were drilled in the geologically-complex Golden Trend area and vicinity, and were, with one exception, 40-acre offsets to a like number of wells which, for comparative purposes, were drilled with conventional water-base fluid.

The wells using the special CMC-oil emulsion fluid were drilled at an average savings of $4544.87 per well, 33.5 percent increase in the rate of penetration, bits made 21 percent more hole, and substantial benefits were reported over conventional water-base fluids.

The conventional water-base mud was composed of clay-water mixtures, having caustic soda and quebracho as other principal additives. The special oil-emulsion mud included the aforementioned components, plus one-half pound per barrel of CMC and 15 percent crude oil by volume.

Although only four sets of the 13 wells were drilled with the same rig, all were drilled with the same type and size rig. As indicated, each set of wells were direct 40-acre offsets, with one exception, which was 80 acres.

Preparation and Character. The effects of oil in mud are well known. Additional costs and lack of improvement upon some of the mud properties, however, have made its use undesirable to some operators. In a limited number of cases, the cost of emulsifying agent needed to produce a stable emulsion makes the use of oil prohibitive. The elimination of the emulsifying agent, and simple addition of oil to the mud system is also undesirable to some because of maintenance expense brought about by evaporation of free oil. Neither does a system of this sort possess the filtration characteristics of an emulsified system.

Oils of high aromatic content, low aniline number, have caused the deterioration of rubber parts. Because crudes become increasingly harder to emulsify below 38° and above 42° they deteriorate most oil-resistant rubber, a paraffin-base crude oil in the 38-42° gravity range was used. Any quantity of oil may be used, but a concentration of 12-15 percent is recommended. In the study conducted in Southern Oklahoma, 15 percent by volume concentration was added and maintained. This concentration was emulsified with one-half pound per barrel CMC. Maintenance requirements called for average daily additions of 7-10 barrels of oil and 25 pounds CMC. These additions varied according to the amount of jetting done each day.

The economical aspect of the CMC oil emulsion can be attested by reviewing the necessitated added expenditures, which are discussed further in another paragraph. For each barrel of mud in the system initial additions would account for $0.40 worth of oil and $0.40 worth of CMC. The amounts, plus maintenance costs, would increase a mud bill an average of $0.143 per foot of hole drilled in southern Oklahoma. This figure was determined by averaging all 13 wells which Phillips Petroleum Company drilled with CMC oil emulsion, where the average drilling rate per well varied from 1.99 feet per hour to 9.03 feet per hour.

The stability of the emulsion was indicated by the absence of free oil at the surface of the mud in the pits.

The system also displayed an improved stability in the presence of NaCl, probably due to the concentration of CMC.

The procedure followed for the preparation of the emulsion was simple and logical. Most wells are drilled in southern Oklahoma by circulating water with a minimum of native solids until a desired mud-up depth is reached, at which time bentonite and chemicals are added to increase viscosity, reduce water-loss, and drop sand. One or two days after mudding-up, with a new bit on bottom, oil was mixed directly into the pump suction from a nearby storage tank. At the same time CMC was mixed through the hopper. The necessary quantities of both were mixed over one or two circulations.

Performance. In most instances, the use of oil emulsion mud was instrumental in increasing the amount of hole drilled per bit, and reducing the number of rotating hours per bit. The latter is contrary to the results obtained in most oil emulsion studies. A probable explanation for bits being

pulled quicker is that they gave better service while they were in the hole with oil emulsion muds; that is, they drilled farther, faster, due to more compression in the drill pipe, a condition which was facilitated through the decrease of friction against and torque in the pipe. Most drilling contractors prefer keeping a sharp bit on bottom to assure maximum penetration rates. Even though the rotating time per bit was reduced, the total number of bits used was generally reduced also, or if not, the footage drilled per bit was sufficient to show an increase in drilling rate for every case.

By dividing the cases listed in Table 2 into two groups as shown, and eliminating Case 13, which was the only test in Caddo County, Case 9, which includes a well not operated by Phillips, and Case 7, a well that combated severe lost circulation, a more itemized account of wells drilled under similar conditions can be obtained.

Nine sets of wells were drilled in the Golden Trend area of Garvin and McClain counties. Wells drilled in this area that used conventional water base mud averaged 74.61 feet per bit at an average rate of 4.23 feet per hour. Wells drilled with oil emulsion mud averaged 90.28 feet per bit and 5.93 feet per hour. These figures represent a 21.0 percent increase in hole drilled per bit and a 40.2 percent increase in rate of penetration. A summary of the effect that CMC oil emulsion had on drilling expense is given in Table 3.

Three sets of wells were drilled in the Doyle Field of Stephens County. Wells drilled in this field using conventional water base mud averaged 39.18 feet per bit at an average rate of 2.53 feet per hour. Wells drilled with oil emulsion mud averaged 49.62 feet per bit and 3.29 feet per hour. These figures indicated a 26.6 percent increase in hole drilled per bit and a 30.0 percent increase in rate of penetration.

Savings. A calculated net savings for the average well in the Golden Trend area amounted to $2,833.85: in the Doyle Field, $9,677.94. A breakdown is shown in Table 4.

In every case but one the CMC oil emulsion paid for itself. In Case 3, however, added expenditures exceeded net savings due mainly to repeated replacement of rubber pump parts. This was necessary due to deterioration caused by using high gravity crude in the mud.

In every case but two the use of CMC and oil caused a need for reduced quantities of other mud additives, especially bentonite. In the two exceptions, Cases 2 and 3, this was not possible because of constant dilu-

TABLE 1

Typical Mud Characteristics for an 8000′ Well in the Golden Trend Area

Mud Characteristics	Native Mud After Initial Treatment of Gel and Chemicals	Conventional Gel, Chemical Mud	Conventional Mud Plus 15% Crude Oil and ½ Lb./Bbl. Driscose
Weight—lbs./gal.	10.1	9.9—10.1	9.7—9.8
Funnel Viscosity—sec.	33—34	38—65	38—65
Stormer Viscosity—CPS.	9	11—30	11—40
Initial Gel—gms.	0	0	0
10′ Gel—gms.	0	0—30	0—30
Water-Loss—7½ min. cc.	8	4.5	2
Water-Loss—30 min.-cc.	17	11	5
Cake—32nds in.	2	2	1.5
pH—paper	9	9.5—11	10.5—11+
Chlorides—ppm.	3000	5000—7000	5000—7000

Typical Mud Characteristics for an 8500′ Well in the Doyle Field

Mud Characteristics	Native Mud After Initial Treatment of Gel and Chemicals	Conventional Gel, Chemical Mud	Conventional Mud Plus 15% Crude Oil and ½ Lb./Bbl. Driscose
Weight—lbs./gal.	9.9	9.8	9.5—9.6
Funnel Viscosity—sec.	32—33	36—130	36—130
Stormer Viscosity—CPS.	5	10—90	10—105
Initial Gel—gms.	0	0	0
10′ Gel—gms.	0	0	0
Water-Loss—7½ Min.-cc.	4.8	1.6	1.2
Water-Loss—30 min.-cc.	10	4	3
Cake—32nds in.	1.5	2	1.5
pH—paper	8.5	9—10.5	10—11
Chlorides—ppm.	1500	1500	1500

TABLE 2

Case Histories

Case No.	Field	Type Mud	Total Depth of Well in Feet	Interval Drilled For Comparison, in Feet	Rotating Hours	Bits Used	Hours/Bit	Feet/Bit	Feet/Hour
1	N.E. Elmore	Conven.	7082	971	215.50	9	23.94	107.89	4.51
		Oil Emul.	7030	987	109.25	8	13.66	123.38	9.03
2	S.W. Panther Creek	Conven.	7359	1185	300.75	18	16.71	65.83	3.94
		Oil Emul.	7330	1165	167.00	12	13.92	97.08	6.98
3	S.W. Panther Creek	Conven.	7696	1632	294.25	17	17.31	96.00	5.55
		Oil Emul.	7645	1570	243.25	17	14.31	92.35	6.45
4	S.W. Panther Creek	Conven.	8128	2046	639.00	30	21.30	68.20	3.20
		Oil Emul.	7926	1820	293.75	16	18.36	113.75	6.13
5	S.W. Antioch	Conven.	7822	1649	332.25	20	16.61	82.45	4.96
		Oil Emul.	7811	1663	265.25	18	14.74	92.39	6.27
6	S.E. New Hope	Conven.	7200	1395	251.75	18	13.97	77.50	5.41
		Oil Emul.	7270	1396	245.25	16	14.31	87.25	6.10
7	North Lindsay	Conven.	11900	1572	745.00	17	43.82	92.47	2.11
		Oil Emul.	11113	1564	413.75	20	20.69	78.20	3.78
8	East Purdy	Conven.	10510	1418	401.75	26	15.45	54.53	3.53
		Oil Emul.	9830	1518	381.75	25	15.27	60.72	3.98
9	East Purdy	Conven.	9740	3285	905.00	52	17.40	63.17	3.63
		Oil Emul.	9920	3450	665.25	36	18.48	95.83	5.19
10	S.E. Doyle	Conven.	8513	1594	1058.50	68	15.57	23.44	1.51
		Oil Emul.	8615	2153	1059.50	66	16.05	32.62	2.03
11	S.E. Doyle	Conven.	7960	647	371.00	22	16.86	29.41	1.74
		Oil Emul.	8306	723	362.75	19	19.09	38.05	1.99
12	S.E. Doyle	Conven.	8200	4458	1215.00	81	15.00	55.04	3 67
		Oil Emul.	8212	4518	823.75	64	12 87	70.59	5.48
13	West Cement	Conven.	5972	2705	626 00	42	14.90	64.40	4.32
		Oil Emul.	6011	2654	613.25	39	15.72	68.05	4.33
Totals and Averages—(Conven. Mud)				24557 Total	7355.75 Total	420 Total	17.50 Avge.	58.47 Avge.	3.34 Avge.
Totals and Averages—(Oil Emul.)				25181 Total	5643.75 Total	356 Total	15.90 Avge.	70.73 Avge.	4.46 Avge.

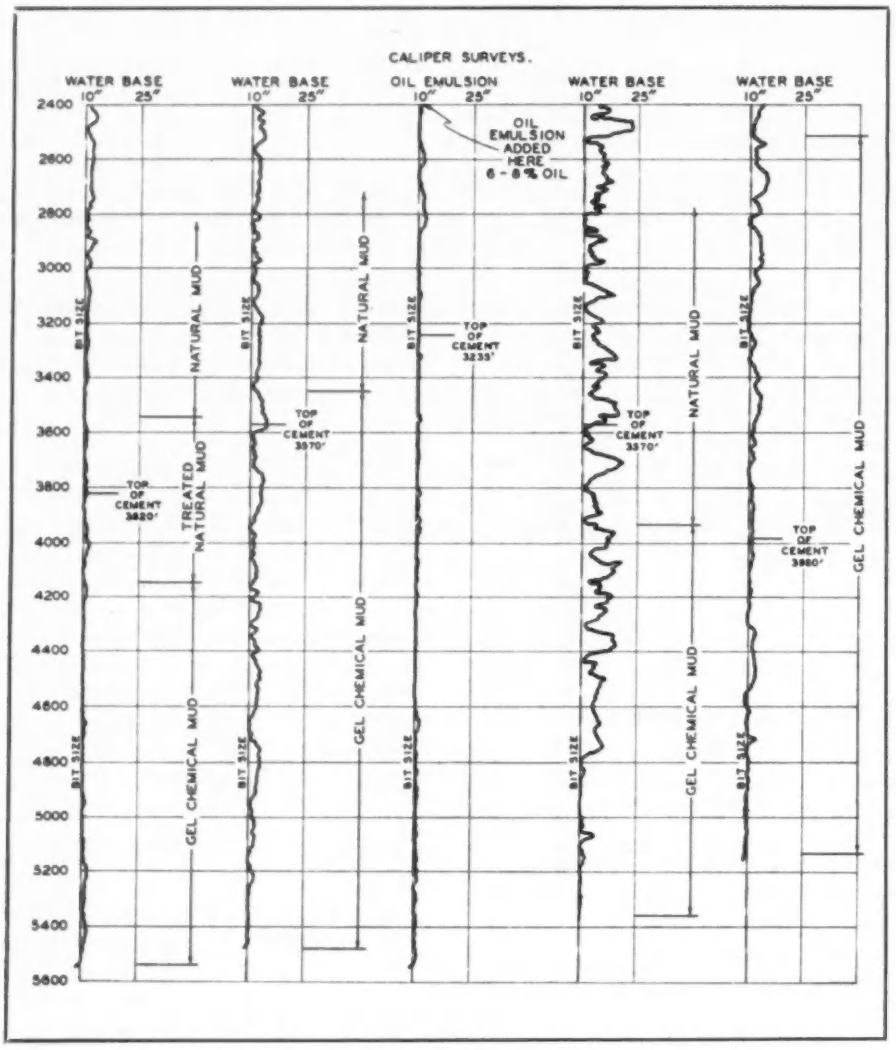


FIGURE 1

TABLE 3

The Effects of CMC-Oil Emulsion Mud

AREA	No. of Wells	Decreased Bits and Trips	Increased Rate of Penetration	Increased Penetration Per Bit	Increased Mud Cost Per Foot of Hole	Decrease in Drilling Expense Per Foot of Hole	Decrease in Amounts of Other Mud Additives
"Golden Trend"	7	17.6%	40.2%	21.0%	$0.106	$0.368	23.9%
Doyle Field	3	21.2	30.0	26.6	0.209	1.155	11.8%
All Fields	13	17.2	33.5	21.0	0.143	0.632	.....

TABLE 4

Average Net Savings Realized From Using Driscose-Oil Emulsion Mud

"GOLDEN TREND" AREA

Gross Savings		Additional Expenditures	
3.4 Bits	$ 460.77	Driscose and Oil	$ 832.00
3.4 Trips	276.22	Rubber Pump Parts	147.08
98.43 Rotating Hours	3,075.94		$ 979.08
	$ 3,812.93		

TOTAL NET SAVINGS = $ 3,812.93 —$979.08 = $2,833.85

DOYLE FIELD

Gross Savings		Additional Expenditures	
13.3 Bits	$ 2,031.84	Driscose and Oil	$1,753.00
13.3 Trips	1,454.75	*TOTAL	$1,753.00
224.29 Rotating Hours	7,944.35		
	$11,430.94		

*No excessive pump parts were required since gravity of crude was below 42° A.P.I.

TOTAL NET SAVINGS = $11,430.94 —$1,753.00 = $9,677.94

tion to decrease density and subsequent mixing of bentonite to maintain viscosity.

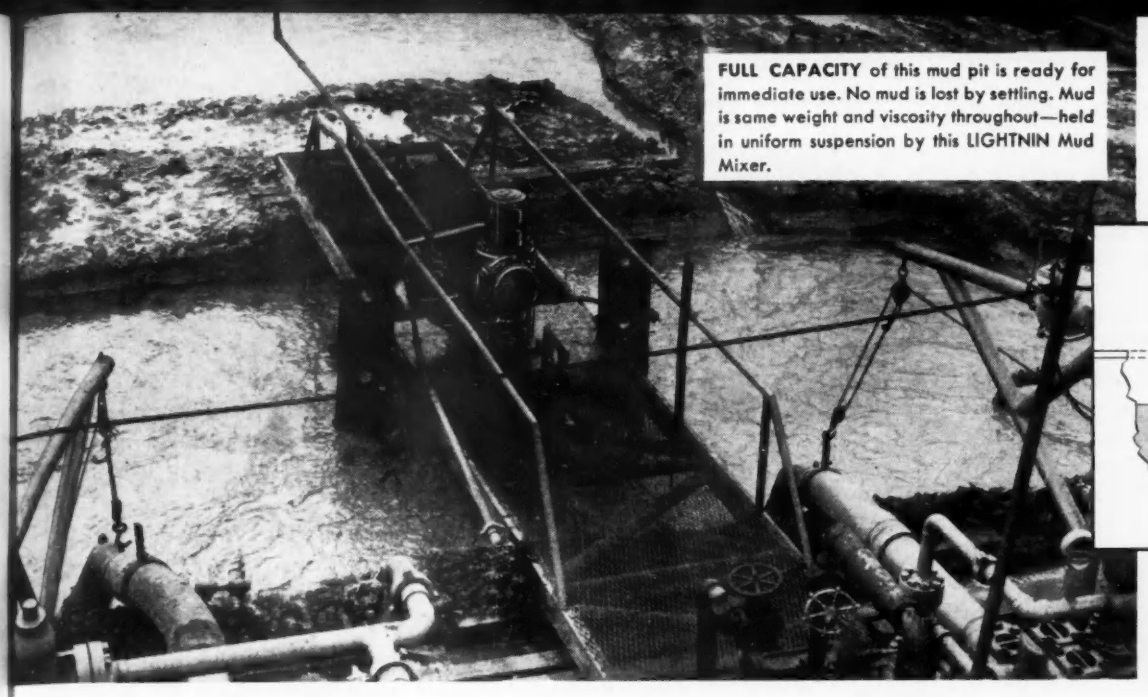
Hole Conditions. There might be isolated cases where an oil emulsion would not pay for itself through an increased drilling rate and improved bit service, but there are other contributions that its use has to offer. It would be worthwhile on fishing jobs, since in many cases it is necessary to circulate oil before recovering lost equipment. There were three pin failures in drill pipe on rigs using oil emulsion mud. In each case the lost section was recovered in less than 16 hours without any difficulty from sticking.

While drilling a well in the S. E. Doyle Pool with conventional mud, the derrick was blown over by a tornado. At the time of the accident the bit was drilling through a formation of shale in the Springer Series, where caving is prevalent. Oil emulsion mud was used to replace the conventional mud for continuous circulation while the rig was being repaired. After four days the pipe was withdrawn with little difficulty.

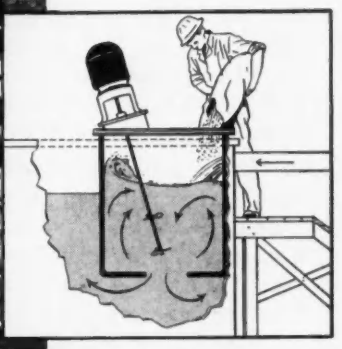
Although there was an absence of conclusive evidence, temperature surveys indicated a better fill-up behind casing on cementing jobs after using oil emulsion mud. A more widespread use of caliper logs in the future should provide more information with regard to hole gauge. In a study conducted by Lummus, Barrett, and Allen,[3] some caliper logs from the Sholem-Alechem Field of Stephens County were compared. The comparison is shown in Figure 1.

Friction. Another important feature of oil emulsion, not readily calculable, is the minimizing of fatigue in rotary equipment from reduced friction between mud and drill pipe. Because of the lubricating property oil possesses, friction is reduced, allowing the drill string to rotate under less torsional strain. The reduction of friction and torque are accompanied by decreased rig depreciation, since less power is required.

A more accurate interpretation of weight on the bit is made possible by freer movement of the drill string in the hole. That amount of weight lost from the buoying action of friction is applied directly to the bit. This un-



FULL CAPACITY of this mud pit is ready for immediate use. No mud is lost by settling. Mud is same weight and viscosity throughout—held in uniform suspension by this LIGHTNIN Mud Mixer.



HEAVIER MUD is obtained almost instantly, by adding weight material through LIGHTNIN Flash Mixer in open-bottom well.

SAVE $67 out of EVERY $100 on upkeep of mud mixing equipment

Mix mud this new, faster, low-cost way that *saves wear* on pumps, valves, fittings

You can knock the spots out of maintenance cost, with a new mixing method that gives you fast, positive control of drilling muds.

This method—proved on over 100 U.S. rotary rigs—can save you as much as half or two-thirds the cost of replacing pump parts, valves, and fittings you now use for mud agitation.

It frees you of the cost of using and maintaining a standby pump for jetting mud. It mixes mud with a small fraction—1/10 or less—of the horsepower normally used for mud mixing.

And it's fast—so fast you'll find it hard to believe until you see it work.

HEAVIER MUD—IN SECONDS. To get heavier mud, you dump weight material into a flash-mixing well as fast as you want—one whole sackful right after another. You get an *immediate* rise in weight throughout the whole mud system. A few seconds is all it takes to increase weight of every gallon of mud by the exact amount you want.

You get *immediate* dispersion of gel ingredients—with fully uniform viscosity in about 20 minutes.

All the mud in the tank or pit stays in circulation—can't settle out. The full tank or pit capacity is there when you need it—ready for instant use.

WHY YOU SAVE POWER. Weight, gel, and other ingredients are flash-mixed into mud entering the tank or pit, by a small high-speed LIGHTNIN Mixer mounted at the inlet. Mud in the tank or pit is mixed uniformly and rapidly by one or two larger turbine-type LIGHTNIN Mixers, mounted over the pit.

The entire mixing job is done with only 10 to 25 horsepower, depending on tank or pit size. You eliminate use of a standby pump—and have full capacity of your main mud pump always available for pumping mud down the hole.

The mixers are fully assembled units, ready to install. They eliminate piping, pump connections, valves, jets and hoppers. The only parts in contact with the mud are the mixer impellers—built to resist abrasion, yet easily replaced at any time for less than the cost of a single valve.

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doubtedly is partially responsible for rate of penetration increases in oil emulsion fluids. The practicability of subjecting the drill string to a higher degree of compression is made greater not only by the lubrication of the drill pipe, but also by the lubrication of the walls of the hole, and the bearings in the cones of the bit.

It is probable also that drilling rates were affected by reduced friction between solid bodies in the mud system. Oil lubricated these particles, as it did the drill pipe and the wall of the hole, to facilitate circulation. Higher mud velocities were made possible by reduced pump pressures. Adherence of mud particles to the drill pipe and bit was noticeably kept at a minimum in the thick shale sections of Stephens County.

Production. There has been no evidence that increased production or completion time can be obtained by the use of oil emulsion mud. In the E. Purdy field, wells completed in a Springer sand would not flow after being drilled with either conventional or oil emulsion mud.

Pump Parts. The only noticeable adverse effect of oil in mud was the deterioration of rubber pump parts. In the S. W. Panther Creek field where crude oils generally range from 42° API gravity to distillate, as many as 45 valve inserts were used in drilling one well. In other fields where the crude oil averaged less than 42° API gravity, there was no abnormal replacement of pump parts.

Oil emulsion mud is capable of invading and impregnating porous zones with enough oil to produce a slight fluorescence, stain, and odor. If emulsified crude oil is above 40° API gravity, it imparts a yellow stain that might be misinterpreted as being high-gravity, virgin oil. Cuttings from formations containing low-gravity oil are not affected by oil emulsion mud composed of high-gravity oil, because they are inherently dark-stained. Likewise, cuttings from formations containing high-gravity oil do not affect muds emulsified with low-gravity crudes. However, difficulty does arise in the visual analysis of samples where oils in the mud and formation are similar.

Results: An oil emulsion is an intimate mixture of two immiscible liquids, one being dispersed in the other in the form of fine droplets.[1] Emulsification can be achieved in different ways by the use of various agents. In using CMC in an aqueous medium that contains bentonite and native clays, a stable mechanical type emulsion is formed by virtue of the colloidal material's ability to restrain coalescence, by the promotion of solid films around the droplets of oil.

Emulsified oil contributes the following principal properties to a drilling fluid: (1) lubrication, (2) sealing of wallcake, (3) oil coating of steel and cuttings.[1,2] Due mainly to these characteristics, and those contributed by the presence of CMC, the following advantages were noted in this study.

Increased drilling rate
Increased bit service
Reduced number of trips
Reduced torque in drill string
Reduced friction on drill pipe
Reduced water loss
Reduced adherence of mud to bit and drill pipe
Reduced shale sloughing
Reduced hole size
Reduced circulation pressures
More accurate interpretation of weight on bit
Easier fishing
Reduced interference
Reduced quantities of mud additives used ordinarily in conventional water-base mud.

About the Author

R. S. BAKER graduated from Southern Methodist University with a B.S. degree in geology in 1950, after his schooling had been interrupted by the war.

Reared in the oil fields, Baker has had varied experience with roustabout and pipe line crews, and worked for Mud Control Laboratories, Inc., at Oklahoma City before finishing college.

In 1950 he joined Phillips Petroleum Company where he worked as a roughneck in the South Texas and South Louisiana areas before going to West Texas in 1951 as a district mud analyst. Early in 1952 he went to southern Oklahoma in the same capacity. Later he was transferred to Corpus Christi as district engineer for Drilling Specialties Company, Bartlesville, Oklahoma, the position he now holds.

Conclusions. The following conclusions were drawn from the study of the wells drilled with the special CMC-oil emulsion mud:

- The rate of penetration was increased an average of 33.5 percent.
- Based on a total of approximately 25,000 feet of comparable formation, an average of 21 percent more hole was drilled with each bit in oil emulsion mud.
- The number of bits used and trips made was decreased an average of 17.2 percent.
- An average of 146.07 hours rotating time was saved on each well that used oil emulsion mud.
- A calculated average of $4544.87 was saved on wells that used oil emulsion mud.
- There was no evidence of improved production.
- Rubber pump parts, including valve inserts and piston-head rubbers, were replaced frequently due to deterioration where high gravity crudes were used.
- Where crude oil in the mud was similar to that in a formation, interpretation of the fluid content of cuttings by visual examination was made difficult.

—The End

ACKNOWLEDGMENT

The writer wishes to give credit to Leroy Williamson of Phillips Petroleum Company, who helped assimilate data into a memorandum form, from which most of the material in this paper was taken.

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[2] Weichert, J. P., "Drilling Fluids Study on Gulf Coast Fields," *Petroleum Engineer* (September, 1952).

[3] Lummus, J. L.; Barrett, H. M.; and Allen, Harry, "The Effects of Use of Oil in Drilling Muds," API Paper 851-27-J, Tulsa Meeting, March, 1953.

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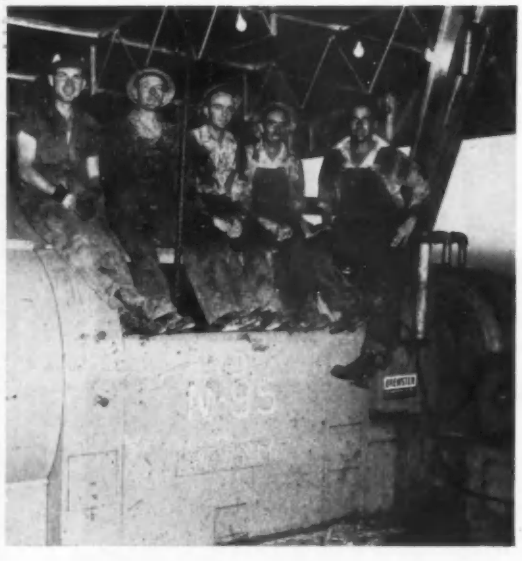
B. L. McFARLAND, president of B. L. McFarland, Inc., drilling contractors, stands proudly beside his new rig.

DRILLER A. G. NORWOOD at the control panel. New drawworks offers eight speeds on drum which are uniformly spaced to give power steps to permit maximum use of rig horsepower.

THE BIG MAC. B. L. McFarland's new rig recently completed its first well near Odessa, Texas.



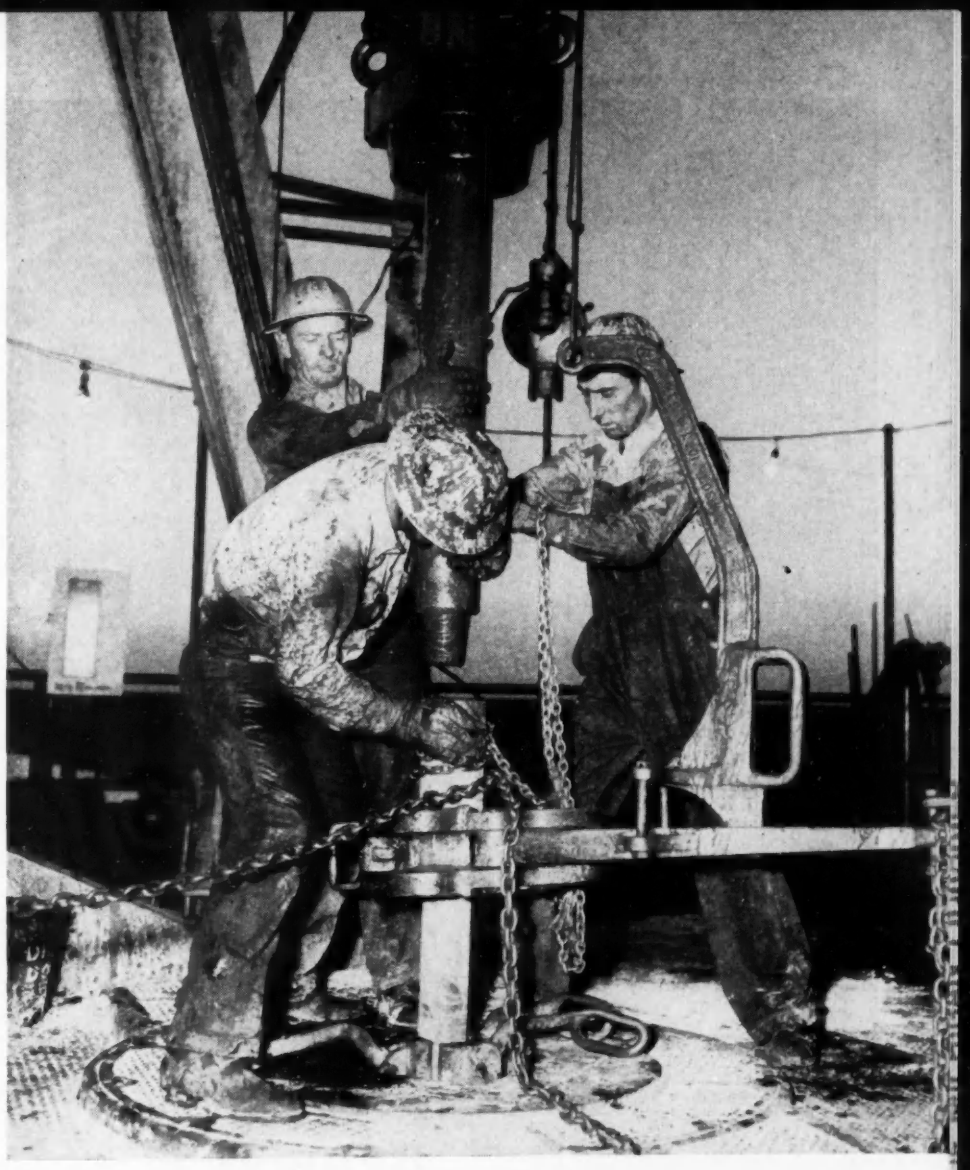
EVENING TOUR CREW atop drawworks. Weight of drawworks without hydramatic brake is 43,000 pounds. Skid width is eight feet, over-all is under ten feet, requiring no special road permit. Drawworks and compound are hauled separately.

Something new has been introduced to the drilling industry. Rated at 1000 HP for drilling to 12,500 feet . . . new in design from rotary table to mud pumps . . . it's a

Deep-Drilling Rig That's Easy to Move

B. L. McFARLAND, INC., has recently completed a well near Odessa, Texas, with a new, highly-integrated, heavy drilling rig that is introducing something new to the industry. Rated at 1000 horsepower for drilling to 12,500 feet, this new rig brings to the field a deep-drilling rig that incorporates the easy-to-move features of a medium-depth rig, plus an entirely new design of the component parts—from rotary table to pumps.

Rig easy to move. The heart of the new rig is the single unit drawworks, horizontally mounted, that includes



FLUSH DECK 22-inch oil bath rotary has a diamond tread surface affording safe footing on rig floor. Crewmen at right are stabbing kelly joint. Rotary table has positive lock, no projection, labyrinth triple grooves. Bearings and working parts are sealed from contamination.

driller's console, transmission, rotary drive, and hydromatic brake, all mounted on the main skid. This unit moves as one load. Engines, drawworks and drive group can be moved in three loads.

Engine compound. The rig is completely flexible in all operations, including the pump drives which are actuated by air clutches at driller's position. Engines are connected to the compound through the air clutches, which serve as quick disconnects and act as flexible couplings. Drive members are mounted on pedestals.

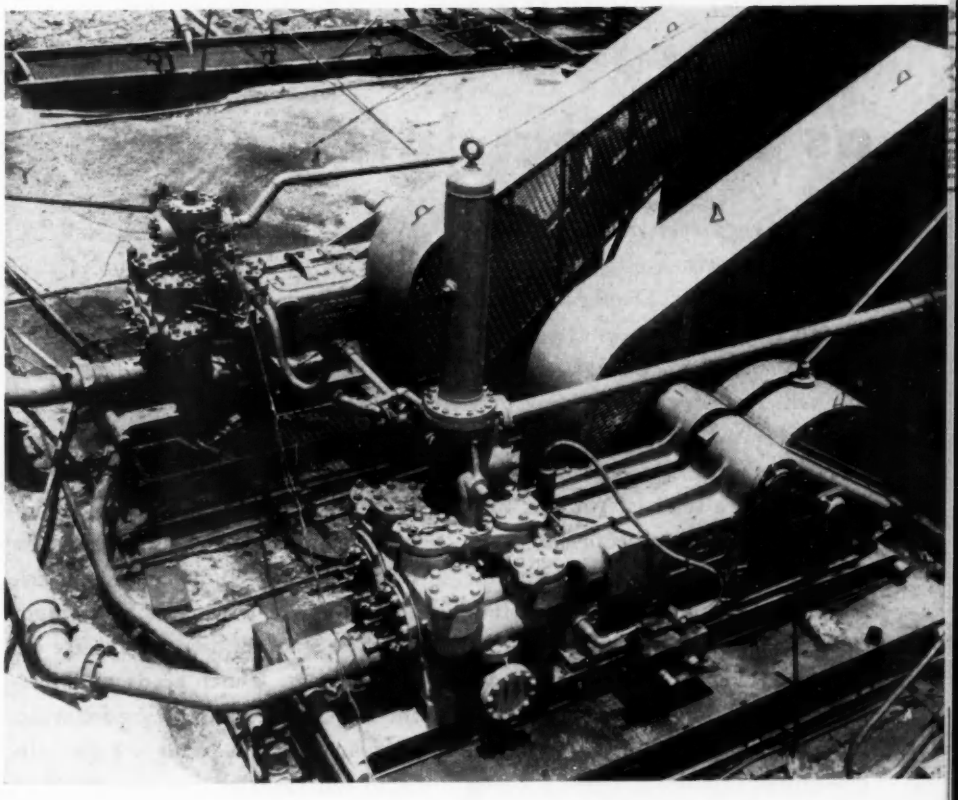
High pump efficiency can be maintained by compounding all engines in the pump drive, while maintaining low rotary speeds. The rotary has a selection of four speeds.

Pumps important feature. The mud pumps feature a new design, an extra high capacity, especially developed for high annular velocities, assisted with easy to manifold or parallel drives. The pumps can be changed rapidly from series or parallel arrangement.

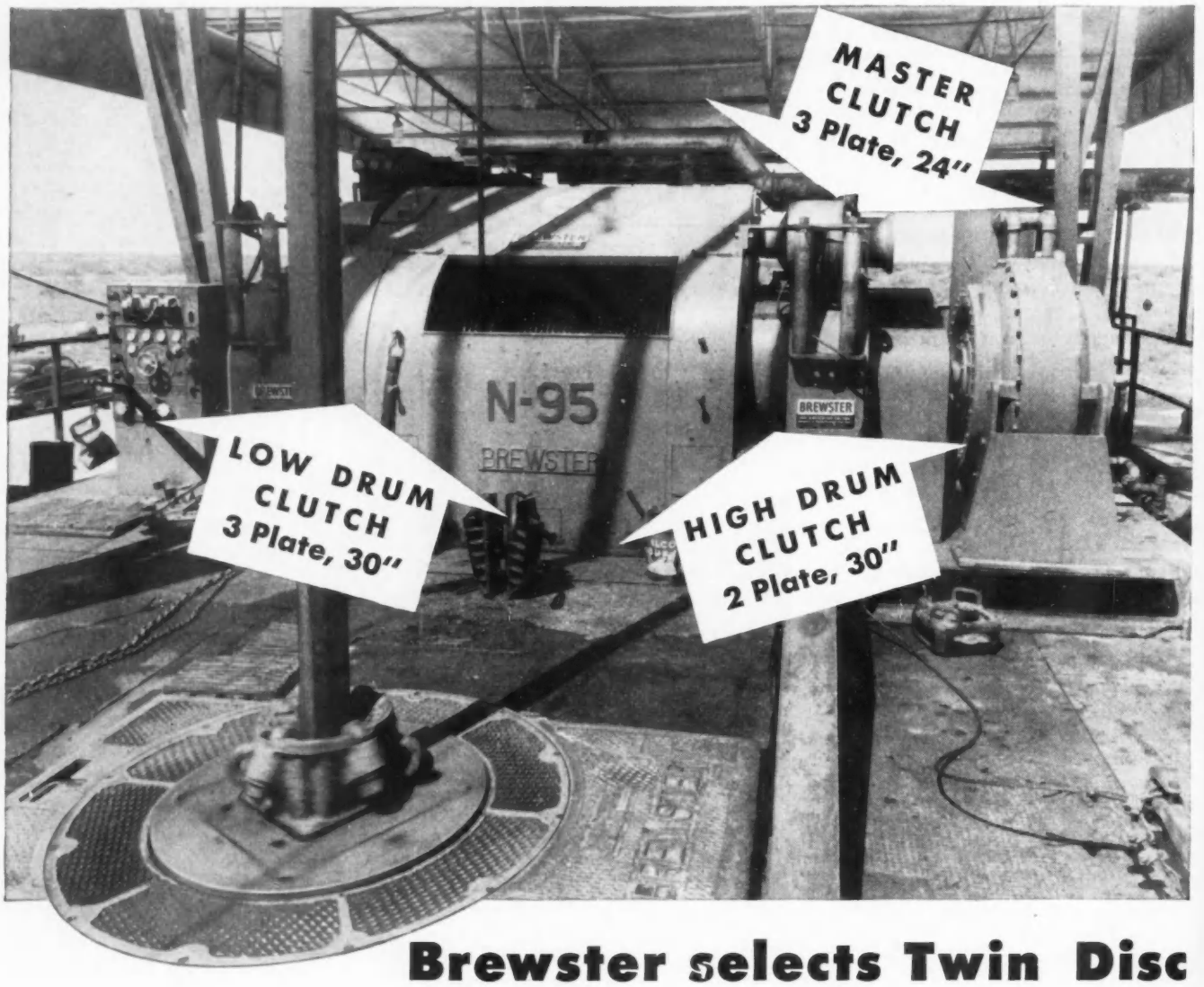
Rotary table. The drive mechanism, regulated at the driller's console, permits the pre-selection of four speeds to the rotary drive and will permit any desired table speed without throttling the engines. This allows operation of the pumps at full capacity and speed, when both pumps and rotary are driven.

The new rotary table features a minimum of rotating surface, permitting the crewmen to work close to the rotary.

Main drum. The maximum hoisting speed is provided by eight forward speeds to the main drum. By rotating a single handle at the driller's con-



MUD PUMPS are designed for high annular velocities. Pumps are arranged for quick moves and rapid changeover from parallel to series arrangement. Dual in-line pump drives at rear of compound simplify rigging-up and manifolding.



Brewster selects Twin Disc Diaphragm-Type Air-Actuated Clutches as working clutches on new N-95

Brewster engineers standardized on the proven performance of "million cycle" Twin Disc Diaphragm-Type Air-Actuated Clutches *as the operating clutches . . . the clutches that put the new Brewster N-95 drawworks to work.*

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In every major field you'll find these Twin Disc Diaphragm-Type Clutches giving dependable, trouble-free service . . . in new equipment, *and in rigs modernized by leading drilling contractors.* These Diaphragm-Type Air-Actuated Clutches offer a ready answer for design into new machinery as well as replacement on existing rigs . . . to give greater efficiency and lower downtime. Here are a few of the reasons *why:*

- Lighter, more compact . . . remote control of power transmission without complicated linkage.
- Reduced initial installation costs through use of smaller clutches . . . yet provide the high torque capacity needed (up to 120,000 lbs. ft. slipping capacity) in heavy, exacting drilling work.
- Less shock-loading during starting cycles, permitting use of smaller driven components . . . provided by light weight which reduces inertia mass.
- More compact installation through narrower width . . . permits use where drum, or band style clutches were previously used.

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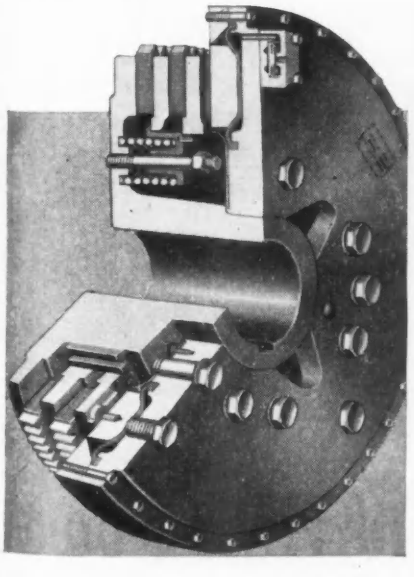
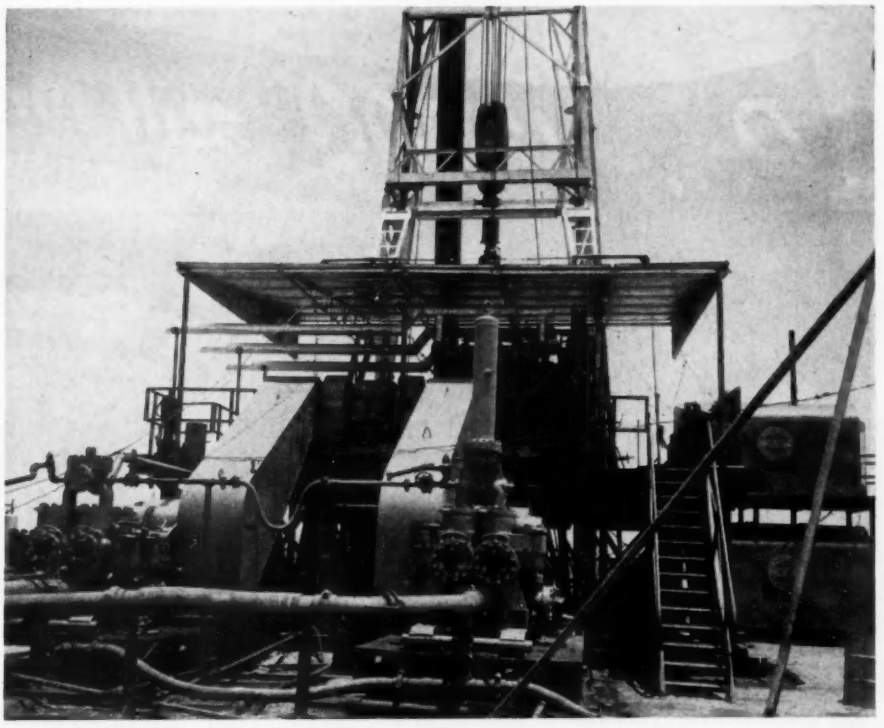
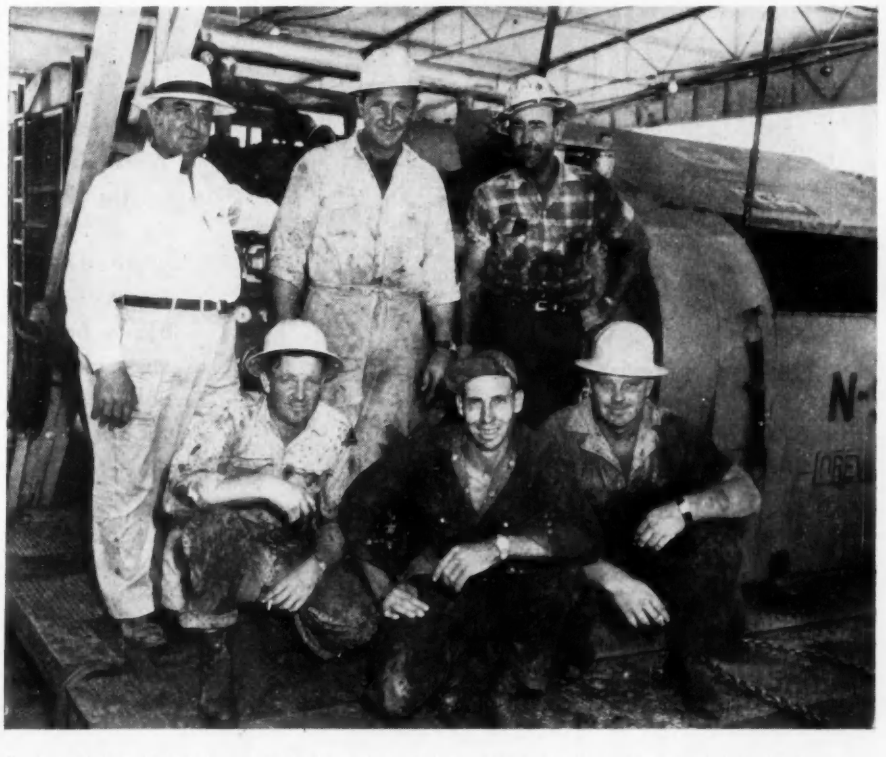




ELEVATED MUD PUMPS. Rear of rig shows elevated mud pumps. Note flexibility and arrangement for fast rigging. Elevated suction lines and facilities for parallel and series operation are of particular interest.



DAYLIGHT CREW on McFarland Rig 6 includes (standing, left to right) C. P. Alexander, toolpusher; T. A. McAnnally, driller, and R. W. Robertson, lead tongs. Kneeling are B. G. Sifford, backups; J. D. Thompson, derrickman, and C. R. McAnnally, motorman.

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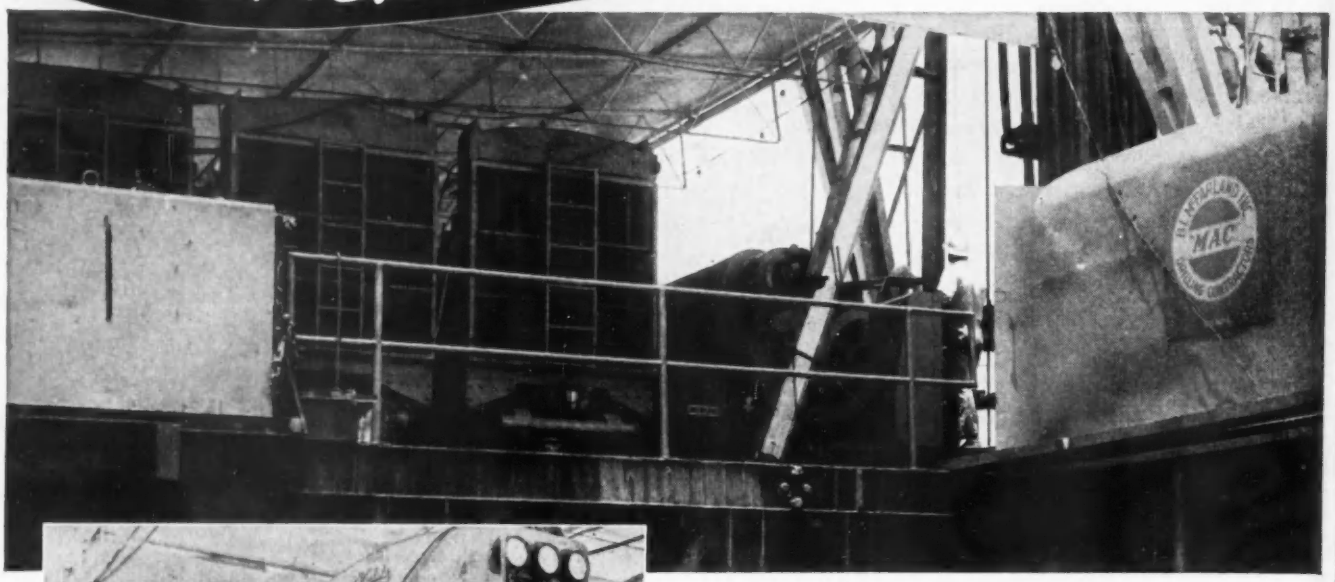

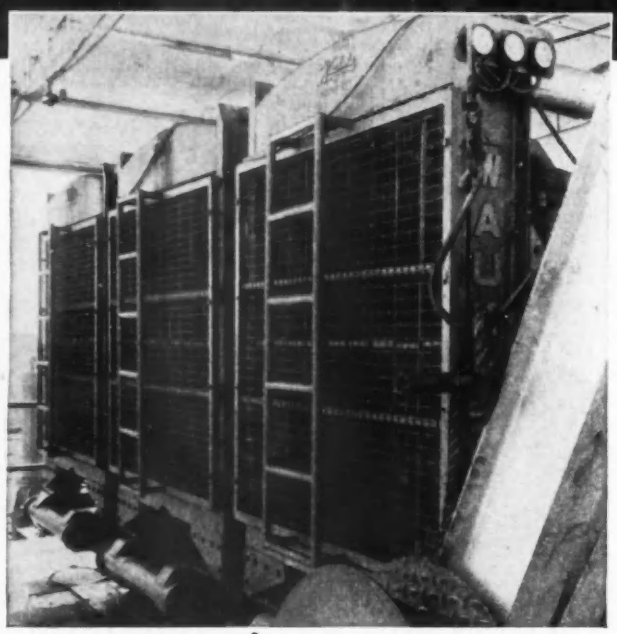

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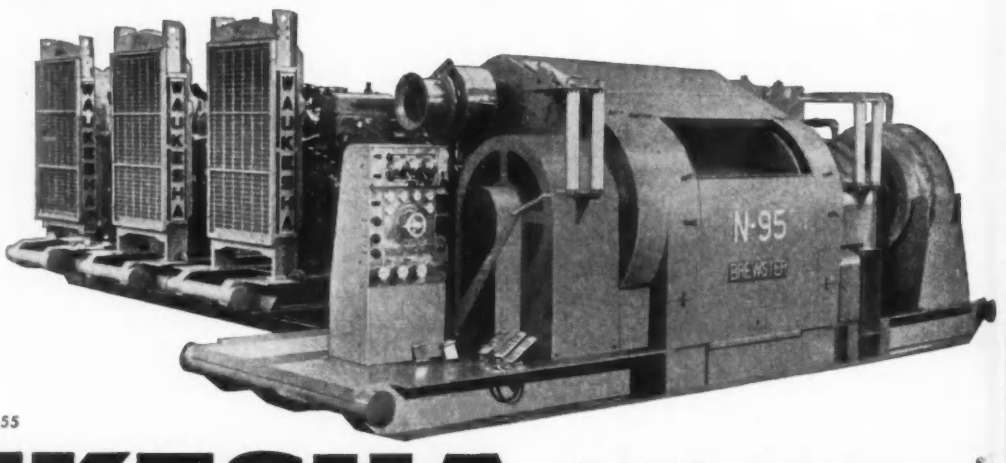

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When running an electric log in a well bore there are many factors which govern the curves that are recorded. Here is a review of the . . .

Limitations in Quantitative Evaluation of Electric Logs

By F. V. MILES, Completion Engineer, Gulf Oil Corporation, Tulsa

THE PRIMARY OBJECTIVE of quantitative interpretation is to establish the fluid saturations of possible producing horizons with special emphasis being placed upon analyzing those sections appearing in wildcat wells. Many intangible parameters are involved in logging analysis, and in many instances considerable difficulty is encountered in ascertaining their value with any great degree of success. Those concerned with interpretation must be fully aware of the limitations involved to properly evaluate the logging techniques even under the most desirable conditions. It is the aim of this paper to review briefly the more obvious restrictions placed upon interpretation and thereby familiarize the reader with a few of the problems involved in logging analysis.

Fundamental Equations of Logging Interpretation. In order to analyze the basic relations involved in logging interpretation, a brief review of the primary equations will be made without delving into the individual derivations or the justification of the relationships.

If it is assumed that SP is entirely electrochemical in nature, the electrochemical potential may be related to the resistivity of the formation water and drilling fluid as follows:[1, 2, 3]

$$E = K \log \frac{Rm}{Rw} \quad (1)$$

where E = electrochemical emf
K = proportionality constant dependent upon temperature
Rw = resistivity of connate water
Rm = resistivity of drilling fluid

Archie[4] has related empirically the resistivity of a porous media fully saturated with a conductive fluid to the resistivity of the saturant at a common temperature by means of proportionality constant commonly referred to as "formation factor." This relationship was expressed as follows:

$$Ro = F\,Rw \quad (2)$$

where Ro = resistivity of formation totally saturated with a saline solution of resistivity Rw
Rw = resistivity of saline solution
F = formation factor

The formation factor is a function of the geometry of the void space, and its magnitude is dependent upon the actual pore configuration and the dispersion of the conductive phase.

Porosity and formation factor are both functions of the pore structure; accordingly, it was reasoned that both quantities were related to one another.[4] This relationship has been expressed empirically in the following manner:

$$F = C\phi^{-m} \quad (3)$$

where F = formation factor
ϕ = porosity expressed as a fraction
C =
m = cementation factor

Archie has considered the constant in this relationship to be unity; however, some investigators[5] have indicated that it may vary.

Guyod introduced the term "cementation factor" for the exponent m, since it was observed qualitatively that the formation factor for any given porosity tends to increase as the sand becomes more cemented.[6] The sands analyzed by Archie[4] indicated that the cementation factor varied between 1.3 in the case of unconsolidated sands to 2.0 for consolidated sands. Guyod[6] has reported cementation factors as high as 2.2, and Wyllie and Rose[7] have suggested an upper limit of 3.0.

The resistivity of a porous medium has been related to saturation by means of a resistivity index defined as follows:[4]

$$\text{Resistivity Index} = I = \frac{Rt}{Ro} = Sw^{-n} \quad (4)$$

where Rt = true resistivity of the porous media with its contained fluids
Ro = resistivity which a formation would have if fully saturated with formation water
Sw = connate water saturation expressed as a fraction
n = resistivity index exponent

Archie's[4] investigations indicated a resistivity index exponent of 2.0, and this value has gained general acceptance in logging analysis. Other authors[9, 10] have suggested values as high as 2.5 and 2.7. Guyod[8] has quoted the results of some Russian investigators which indicate exponents as high as 4.3.

Limitations of Interpretation. The determination of fluid saturations concerns itself basically with establishing the resistivity which a formation would have if it were fully saturated with its connate water and the true resistivity of this zone under reservoir conditions.

Resistivity of Connate Water. Normally, as in the case of wildcat wells and development wells in which no formation water is produced or where no water analyses are available, one must depend on the electric log to establish the resistivity of the formation water. With reference to equation (1), it is assumed that the self-potential developed in a well bore is

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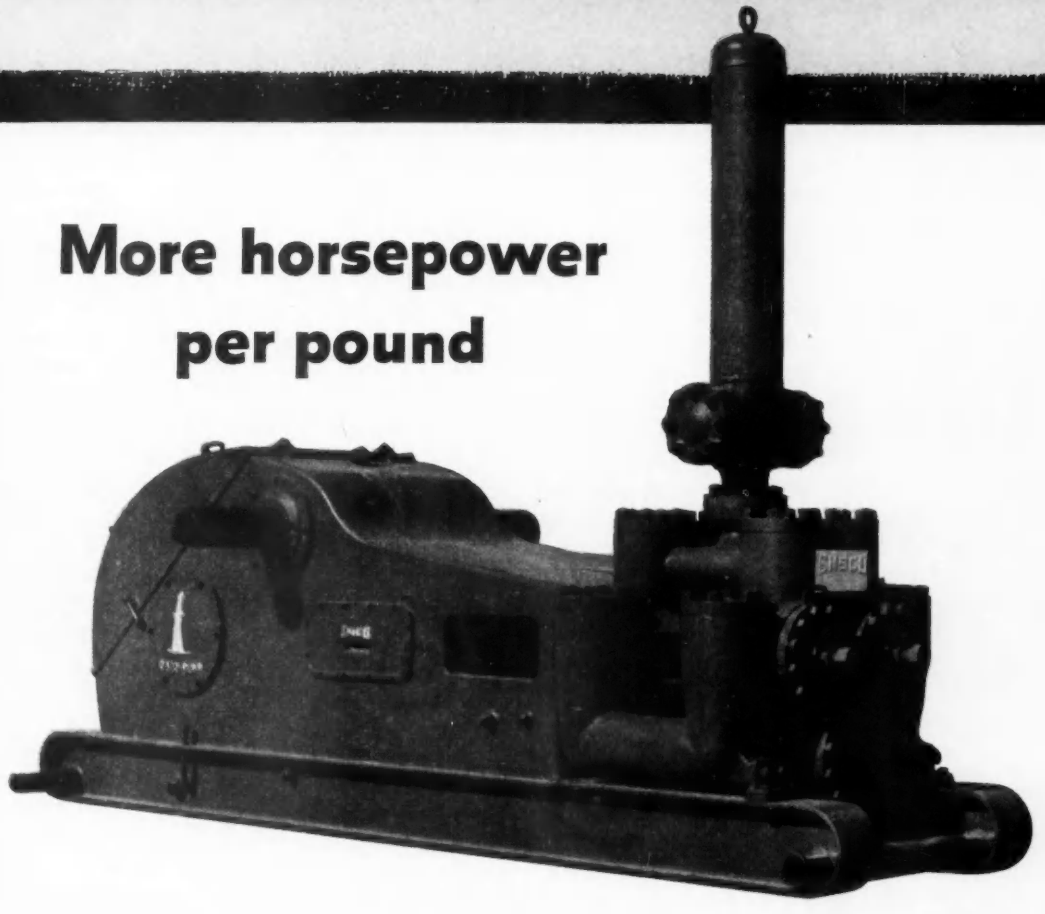

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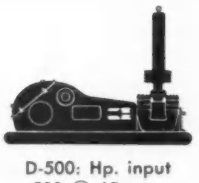

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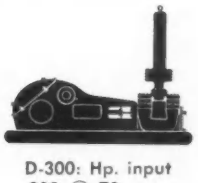

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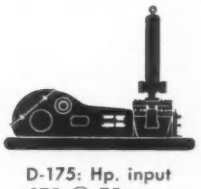

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due entirely to electrochemical effects. Although it is theoretically unsound to neglect the electrokinetic phenomenon, it can be justified from a practical standpoint since this component usually represents only a small portion of the total potential developed.

The maximum deflection measured from a shale base line developed on the SP diagram is utilized in ascertaining the resistivity of formation water. Theoretically, the maximum potential developed in a bore hole would be under conditions of static equilibrium; however, in practice a dynamic state exists and an SP current flows in a well bore, which results in the potential development deviating from the static condition. The shape and amplitude of the SP curve opposite a given bed is usually influenced to some extent by the following factors:[11, 12, 13]

1. The total electromotive forces produced
2. Thickness of the bed
3. Diameter of the bore hole
4. Resistivity of the bed, the surrounding formations, and the drilling fluid
5. Depth of penetration of the mud filtrate
6. Presence of shaly material within the bed being analyzed

All factors remaining the same, a change in the electromotive forces affects the amplitude but does not modify the shape of the SP curve. The electrochemical effect is a function of the activity of formation water and the activity of the mud.[13] When it is assumed that the total emf developed is a result of this phenomenon only, small discrepancies in calculated activities may result. Usually, for the range of salinities normally encountered in the Mid-Continent area, small changes in activities will result only in minor variations in resistivity since both are related exponentially. Of course, in those sections where the formation waters are relatively fresh, such as the Rocky Mountain area, variations in activities will usually give more pronounced effects. The thickness of a bed in the case of sands influences the amplitude on the SP only below the critical thickness of two times the hole diameter. In the case of limes or highly resistive formations, the relationship between bed thickness and SP development is more complex, resulting in general distortion of the SP diagram.

Invasion by mud filtrate also affects the SP in a manner similar to the effect of an increase in hole diameter, decreasing the peaks recorded and rounding off formation boundaries. The effect of resistivities on the SP is expressed by means of the resistivity ratio $\frac{Rt}{Rm}$ defined as the ratio of true resistivity of a formation to the resistivity of the drilling mud. When the ratio increases, the SP log becomes rounded, peaks are reduced in amplitude, and log detail is decreased. Argillaceous material has a deteriorating effect on the SP, rounding its bed boundaries and decreasing the peaks developed.[11, 12]

It is apparent from the above discussion that there are many factors which govern the accuracy of calculating connate water resistivities from the SP diagram. This is especially true in the case of wildcat projects. At best we are forced to rely upon a technique which possesses some restrictions in established producing areas where some water analyses are available and far greater limitations in areas of wildcat activity where little is known of the nature of the connate waters. To keep the possibility of error at a minimum, wherever possible actual water analysis data should be employed in logging evaluations. An exception to this would be the evaluation of shaly sands[14, 15, 16] where it is necessary to utilize the actual dampened or pseudo-SP development to ascertain the presence of hydrocarbons.

Resistivity of a Porous Media Saturated with Connate Water. It has been mentioned previously that the formation factor relates the resistivity of a sand fully saturated with a saline solution and the resistivity of the saturant. Therefore, in order to calculate the resistivity of a water-saturated body, assuming that the resistivity of the formation water is known, it is necessary to establish the order of magnitude of the formation factor. This problem can be resolved by estimating its value from subsurface information, by calculating its value employing logging techniques designed for this purpose, and by establishing this factor by routine core analysis.

The formation factor is a dimensionless quantity and is a direct function of the physical character of the formation. It is, therefore, a function of the processes of sedimentation and is dependent on grain size and shape, the nature of compaction, the chemical composition of the rock matrix, and the quantity and nature of the cementing material.[6] Laboratory-determined formation factors are most desirable for logging interpretation; however, from a practical standpoint, quite often such data are not readily available. In their absence an approximation can be obtained by other means, such as geological sample data, selective logging techniques, or a combination of both.

It is usually possible for a geologist running samples on a well to supply a description of the physical characteristics of the formation from which a fair estimate of the porosity can be obtained. With this information, plus the results of core analysis on similar sections found under comparable circumstances and a mounting experience obtained in previous studies, the formation factor may be estimated and Ro calculated.

Several service companies are presently investigating the measurement of formation factors directly within a well bore. Such devices, available to a limited extent[17] are designed to measure the resistivity of a segment of the invaded zone; that is, resistivity of that portion of the formation invaded by mud filtrate. If it is assumed that a zone is flushed by mud filtrate, knowing the resistivity of the mud filtrate and the resistivity of the invaded zone, the formation factor can be calculated.

Assuming that the resistivity of the invaded zone can be measured with a good degree of accuracy, the primary stumbling block in this technique is the necessity of establishing the resistivity of the mud filtrate. As yet, the measurement of mud filtrate resistivities is not standard field procedure due to the reported lack of acceptable conductivity cells. At present we are forced to use "rules of thumb," such as assuming that the resistivity of mud filtrate is either eight-tenths of, or equal to, the resistivity of the drilling fluid, or utilizing tables or appropriate charts which relate the resistivity of drilling mud to the resistivity of its filtrate under a given set of conditions. The problem of filtrate resistivities is being investigated, and it is quite likely that well

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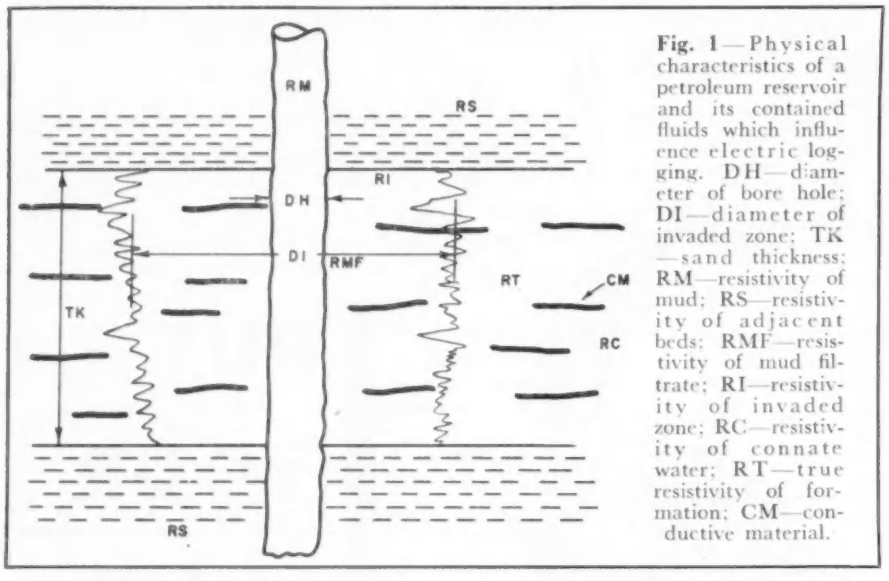

Fig. 1—Physical characteristics of a petroleum reservoir and its contained fluids which influence electric logging. DH—diameter of bore hole; DI—diameter of invaded zone; TK—sand thickness; RM—resistivity of mud; RS—resistivity of adjacent beds; RMF—resistivity of mud filtrate; RI—resistivity of invaded zone; RC—resistivity of connate water; RT—true resistivity of formation; CM—conductive material.

site measurements may be available in the near future. Logging techniques which confine their zone of investigation to the invaded portion of a formation are of considerable assistance in logging interpretation since they give a means of measuring formation factor directly; accordingly, they have received widespread field acceptance.

Another method of estimating the formation factor involves the use of the neutron log.[13] The method necessitates establishing a neutron-deflection/porosity relationship to obtain porosities and, therefrom, the formation factors of low porosity sections such as are often encountered in limestones and dolomites. The method is based upon the fact that the response of a neutron curve is to a considerable degree dependent upon the porosity of formations surveyed. The neutron deflection is measured from a reference line and the porosity from similar zones of other wells in an area being studied. This technique is especially adaptable when logging in oil-base drilling fluids since no other logging system indicates formation factor when such fluids are employed.

True Resistivity. Resistivity logging consists of the measurement of the resistivities of formations in situ. Due to many bore-hole conditions, the values usually recorded with these instruments are only apparent resistivities and must be corrected to obtain an approximation of true resistivity.

To discuss apparent resistivities, one must be aware of those subsurface conditions which effectively deteriorate true resistivity. Measured resistivities are affected by the following factors as indicated on Figure 1:[6, 18]

1. Resistivity of the drilling fluid
2. Diameter of the well bore
3. Resistivity of the mud filtrate
4. Diameter of the invaded zone
5. Presence of argillaceous or conductive material in the formation
6. Thickness of the bed being measured
7. Electrode configuration
8. Resistivity of adjacent beds

Of all these properties it is difficult to estimate which ones are most important. Bed thickness will round and distort the symmetry of the resistivity curve. In most instances the other factors tend to influence the peak development of the resistivity curve, causing it to deviate further from its true value.

Generally, two types of resistivity curves are recorded: the normal or two-electrode curves and the lateral or three-electrode curves. Both curves usually measure only the apparent formation resistivity, and both must be corrected to obtain a value for true resistivity. The relationship between apparent and true resistivity under idealized conditions has been studied by several logging concerns, and as a result, correction curves, commonly referred to as "departure curves," have been constructed.[19] These curves demonstrate the manner in which the resistivity ratio of a bed of definite thickness reacts with changes in spacing, hole size, thickness, degree of invasion, and the resistivity of the adjacent formation.

Several logging combinations are available; however, the standard procedure in most areas is to record two normal and one lateral or one normal and two lateral resistivity curves. When necessary, the values recorded are corrected by means of appropriate departure curves to establish "true resistivity." Departure curves are employed extensively in logging evaluations, especially where beds possess a thickness of less than fifty bore-hole diameters, and have proved to be of considerable assistance. However, they should be used with caution and a full understanding of their limitations.

A more direct method of determining true resistivity is to utilize a logging device with a deep zone of investigation and one that is not influenced to any great extent by an invaded zone. One such device focuses a sheet of current, the depth of which is controlled, and measures the resistivity of a known thickness, dependent upon the electrode spacings.[20, 21] These devices will give a relatively accurate measure of the true resistivity when the resistivity of the drilling mud approximates the resistivity of the formation water. The resistivity of the mud should not exceed three times the resistivity of the connate water; however, the sonde can be used in oil-bearing horizons with a fair degree of accuracy in muds up to ten times as resistive as the formation water. In either case, however, it is necessary to correct the apparent resistivities by means of departure curves.

Another device which has proved helpful in resistivity logging is the Induction Log.[22] This instrument, by means of a system of coils which are designed to give a focusing effect, measures the conductivity of beds of finite thickness. It was designed primarily to log in the presence of an oil-base drilling fluid when it is very difficult to attain electrical contact with the formation using conventional techniques. In most instances the resistivity measured by an Induction Log recorded in an oil-base mud will give a good approximation of true resistivity. If the bed logged is quite thin, or if the bed is very much more resistant than the adjacent beds, a correction is sometimes desirable. Due to the difficulty of logging a satis-

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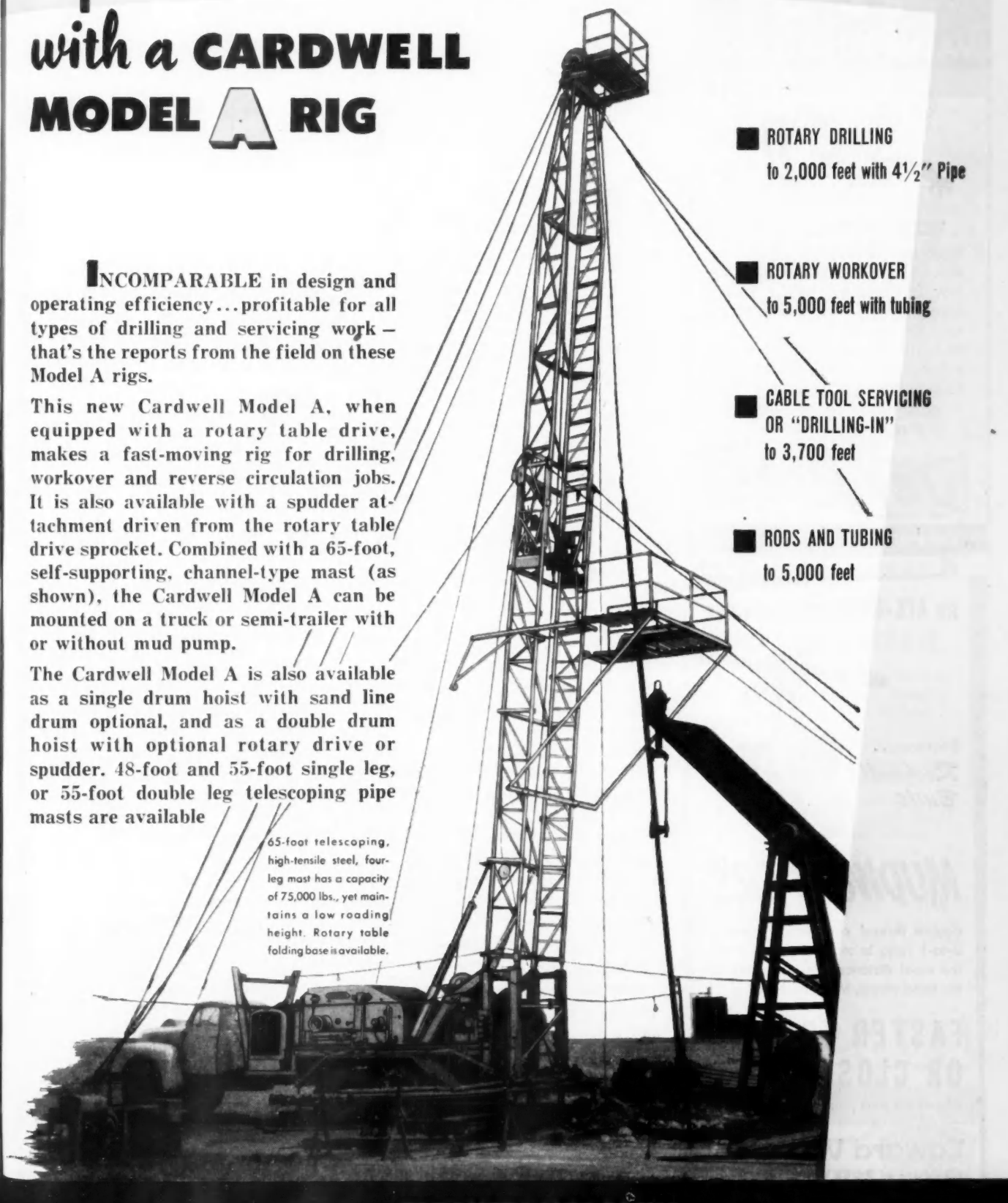

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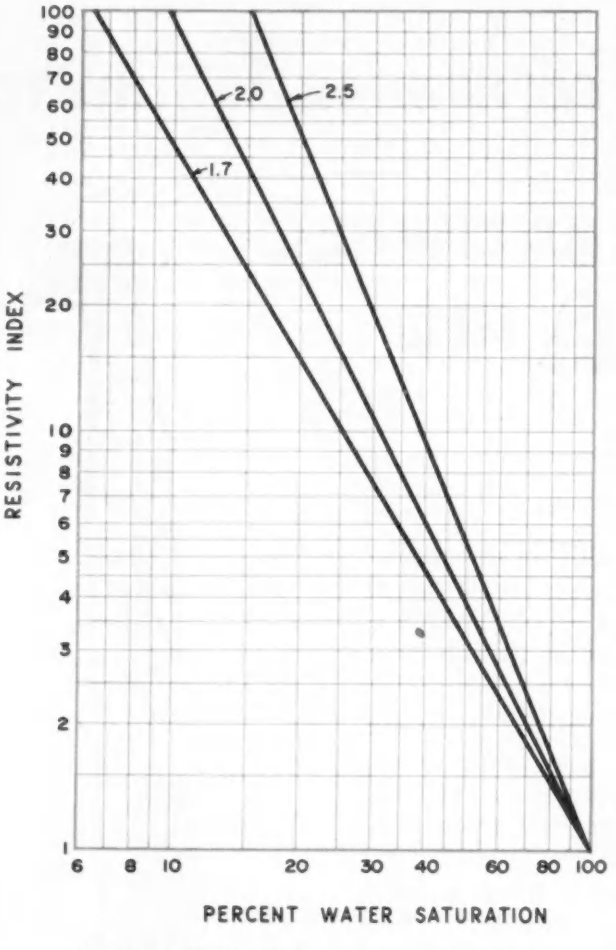

Fig. 2—Resistivity index vs. water saturation.

factory SP curve in oil-base drilling systems, the use of the Induction Log in quantitative studies is restricted to those areas where there is sufficient data to ascertain the order of magnitude of the formation factor and the resistivity of the connate water.

Fluid Saturations. Equation (4) relates the resistivity index with water saturation exponentially. The exponent of this relationship is dependent upon the physical nature of porous media. Figure 2 indicates that the relationship is linear on logarithmic paper and the slope of the plot, commonly referred to as the resistivity index exponent "n", varies between 1.7 and 2.5.[7] In practice, the exponent "n" usually lies between the above limits and is generally considered to be 2. If the resistivity index is known, a range of water saturations can be determined dependent upon the nature of the reservoir being considered.

Conclusions. It is apparent from this discussion that the accuracy of the various logging techniques is influenced by many intangible variables, and as a result, quantitative studies possess definite limitations. Logging interpretation is not an exact science at present; however, it can be employed quite successfully in development areas where coring and testing information have defined the nature of the producing horizon and its fluids. Interpretation is more restricted in areas where little is known of the characteristics of the formations to be encountered and their contained fluids. In brief, logging is another tool which the petroleum industry has at its disposal to assist in evaluating the horizons which offer commercial possibilities.

Prior to commencing drilling operations, a drilling mud-logging program should be designed which will enable the operator to efficiently and economically record the electrical data necessary for quantitative studies. In addition, provisions should be made to log as soon as practicable after penetrating a potential pay. This will enable a log to be recorded which will not be influenced to any great extent by an invaded zone. Extensive mud filtrate invasion hinders the determination of true resistivity, and if it can be kept at a minimum, the accuracy of such calculations will be greatly enhanced. This is especially important in the case of wildcat wells. This practice will enable an adequate investigation of the productive possibilities of the objective horizons as well as other likely producing sections which might be encountered in the well bore.

Logging data should be accepted as evidence of either the presence or absence of hydrocarbons, as well as their relative saturations, in the same manner as drilling and geological in-

formation have been utilized in the past. Upon penetrating a likely pay horizon, all the available data should be analyzed with caution and a full realization of the limitations involved so as to reasonably establish the productive possibilities of a formation.

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ACKNOWLEDGMENT

The author expresses appreciation to Gulf Oil Corporation for permission to publish this paper. Appreciation also is expressed to R. B. Wilkins, Gulf Tulsa division, and Dr. M. R. J. Wyllie, Gulf Research Development Company, for suggestions and comments.

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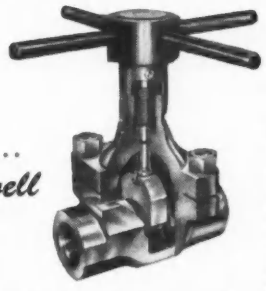

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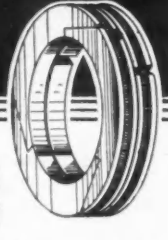

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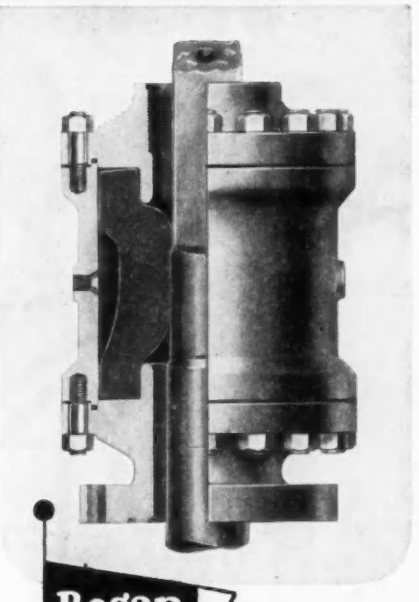

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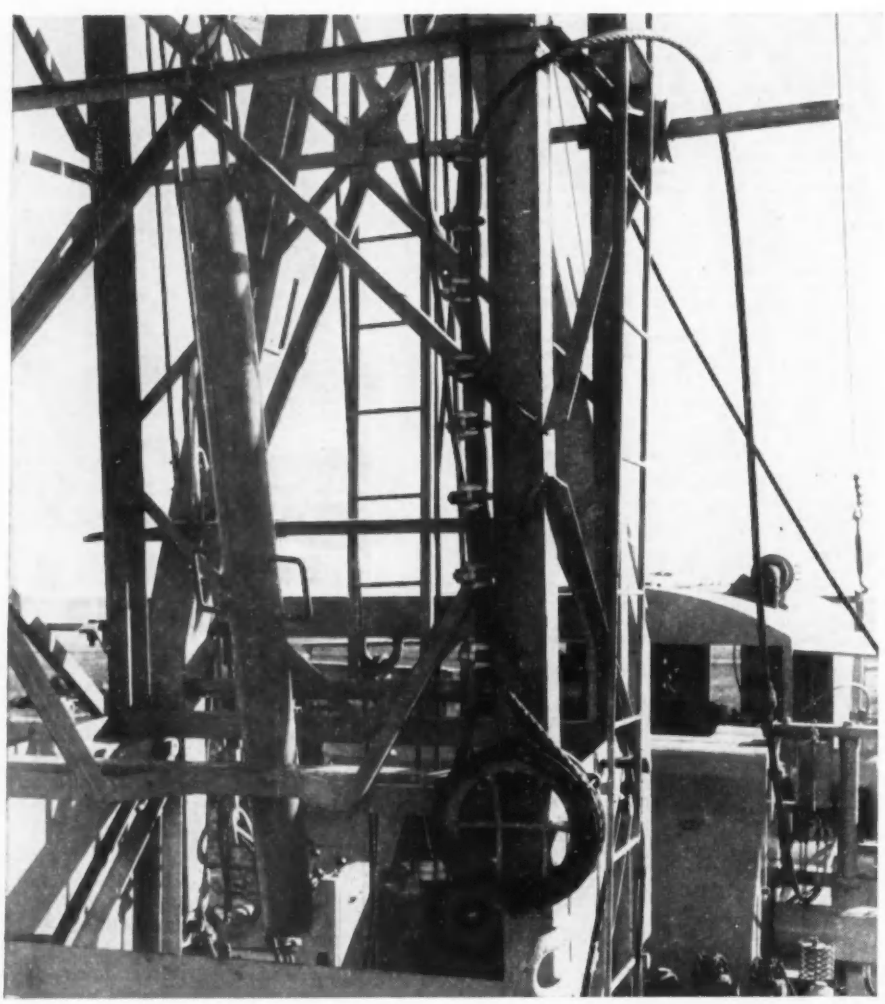


New Way to Slip Drilling Line Devised

Joe Beard, president of a drilling contracting company in Houston, has a unique way of slipping the drilling line on his new rig.

The dead line is looped around a reinforced steel ring, which has been welded to the front supporting leg of a 96-foot derrick. First, a catline is used to lift a wire line spool to an axle welded eight feet above the floor level on the back leg of the mast as shown in the accompanying figure.

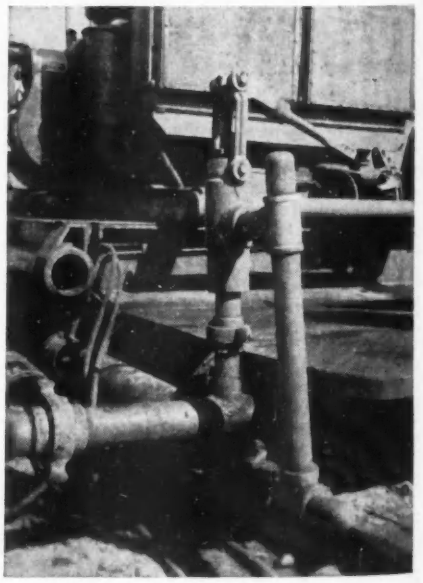
Eight wire line clamps are used to hold the line securely. When the line has served its duration of ton-mile service, the clamps are loosened and the line excess is reeved on the spool mounted in the derrick. This minimizes rig up problems since the spool travels with mast during rig moves. The line is reversed frequently and is slipped often enough to offer maximum safety.

Relief Valve on Walkway Is Convenient to Work

Empire Drilling Company of Wichita, Kansas, puts the bleeder line from the mud line at a convenient place near the pits so that it requires less pipe to hook up and is convenient to the work.

A collar is welded to the top of the line connecting the pumps to the rig at a point near the engine base so that by bursting loose only two quick acting unions, the engine skid can be separated from the mud pump and the blowoff valve disconnected and moved with the engine assembly. The discharge line from the valve to the pits is placed conveniently inside the base of the engine skids so that it moves with the engine.

If it is necessary to remove the valve for any reason, another quick acting union is placed at the entrance to the skids so that the valve can be taken entirely free from the assembly.



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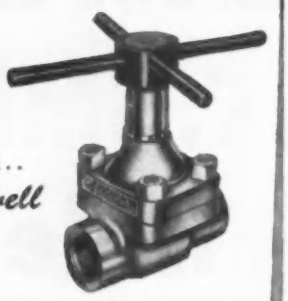

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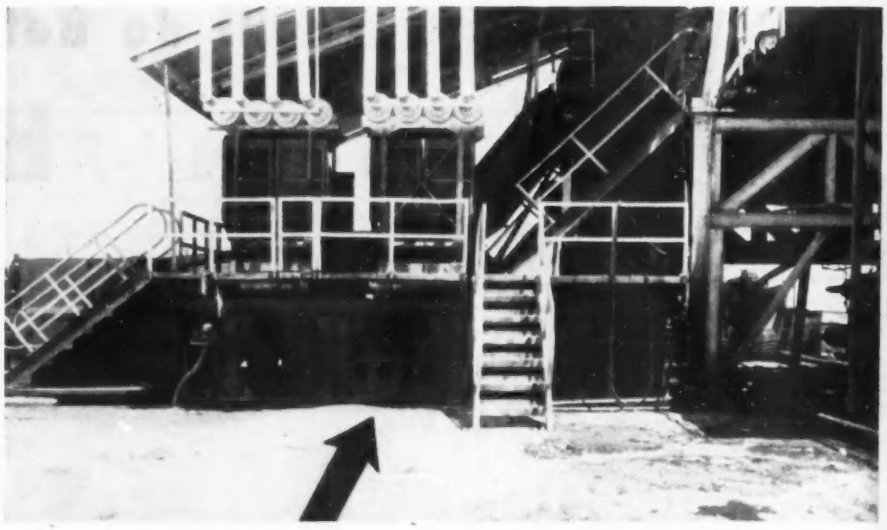

Liners Can Be Stored in Substructure Base

In the Denton area of New Mexico, the Southeastern Drilling Company has designed a convenient way of storing slush pump liners under the rig floor in an accessible place for quick changes. By paneling the side of the heavy steel substructure base with a heavy gauge steel plate as shown and cutting holes of sufficient size to permit the insertion of various liner sizes, Southeastern has found a way of better housekeeping and protection of liners about the rig.

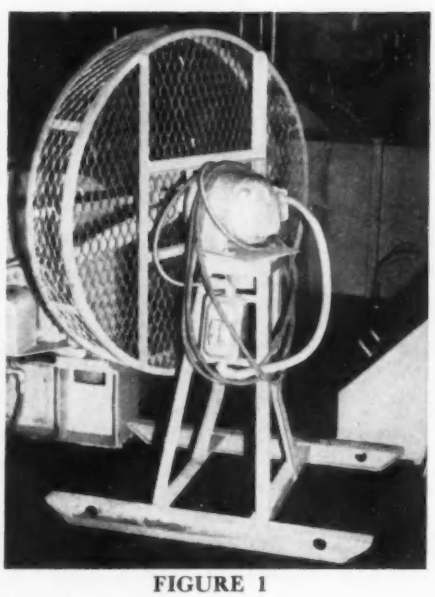

FIGURE 1

Dual, Single Fan Stands Direct Cooling on Rig

On the Gulf Coast many drilling contractors are putting bug blowers to good use by designing special stands to direct the cooling to key spots on the derrick floor. In the summer it is highly desirable to have a number of fans on the floor for cooling purposes and also to drive off the mosquitoes. By mounting the fans sturdily to channel iron skid frames, fans may be directed to cover the working areas with safety, and are unitized to facilitate moves.

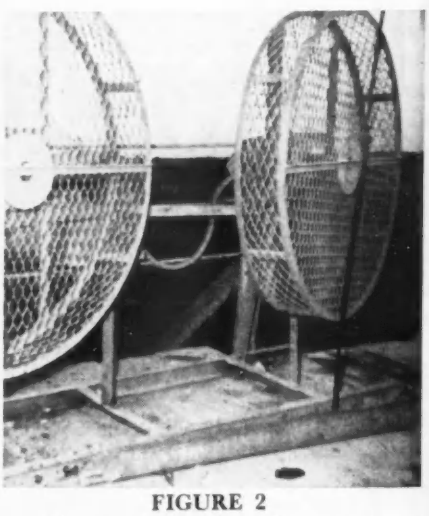

FIGURE 2

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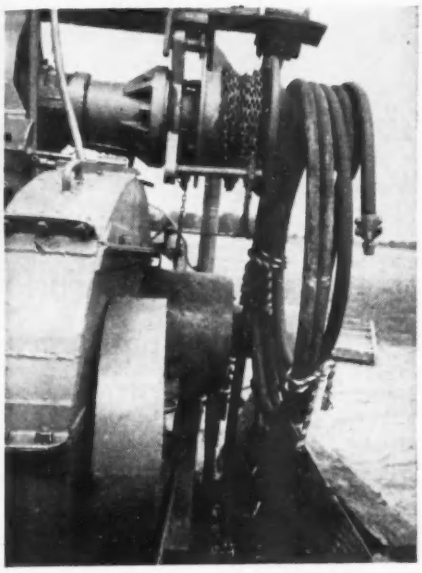
Figure 1 indicates the stand design commonly used on drilling barges in the area. Figure 2 shows a dual mounting.



Cathead Provides Rack For Water Hose in Moving

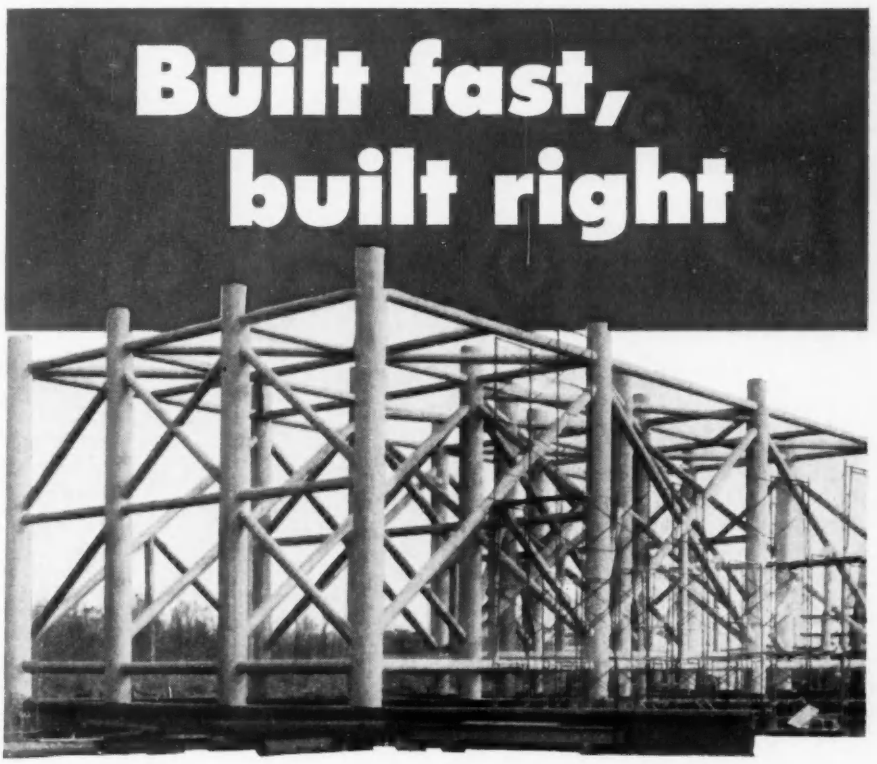
One contractor puts his connection for the washdown hose at a convenient place under the main cathead on the drawworks and it is unnecessary to disconnect the hose during moving operations. The hose is simply coiled around the cathead and is ready for use when the drawworks is spotted and the hydraulic brake hooked up.

The spinning chain is then wrapped around the automatic cathead and is ready for operation on the next location.

Standpipe Makes Cushion For Surges of Mud Pump

A simple standpipe which provides a cushion for the surges of the mud pump may be fabricated from a piece of eight-inch surface casing. A tee is placed in the mud line at the foot of the standpipe for the rotary hose and a quick acting union installed on the nipple leading from the tee.

The standpipe is made by taking a joint of eight-inch pipe and swaging the lower end down a three-inch nipple which will screw into the tip of the quick acting union. The other end of the pipe is "orange-peel welded" shut and a bail made from



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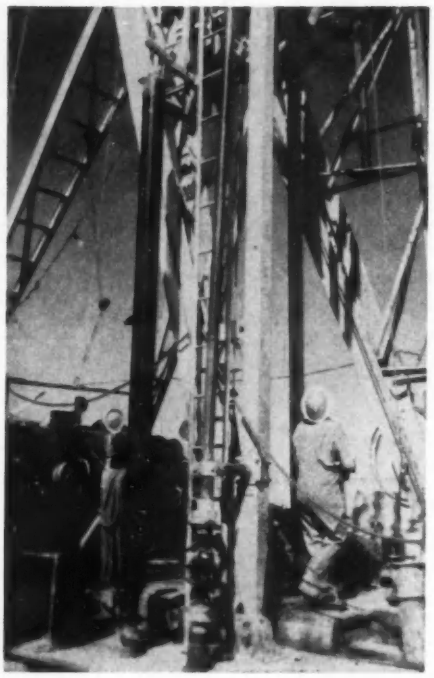

sucker rod material is welded over the end of the entire unit.

In rigging up, the catline is looped over the top of the derrick and hooked to the bail shown. The unit is raised and the quick acting union made up. A device which folds out from the rig made out of flat metal is used to hold the standpipe in place and can be installed in a matter of minutes.

When it is time to rig down, the bolts in the flat pieces of metal are loosened, the union at the base unscrewed and the pot is layed on the derrick floor during moving operations.

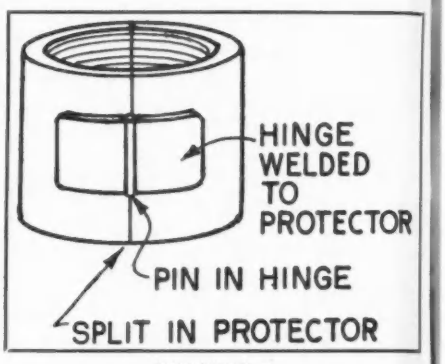

FIGURE 1

Casing Protector Is Time-Saver on Rig

When running long strings of protective pipe or casing, time may be saved by the utilization of a makeshift casing protector. One drilling

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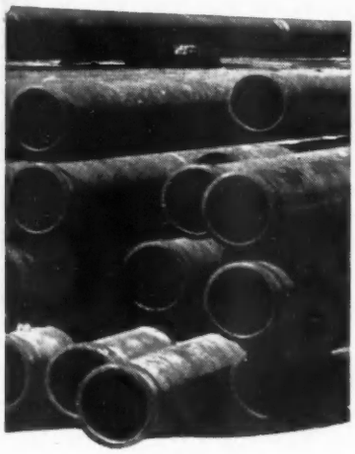

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contractor in the Louisiana area has used an ordinary casing protector split in half; welded a hinge on the outer side and a spring latch on the opposite side. Figure 1 shows the coupling, the hinge welded in place, and the split. Figure 2 indicates the spring welded to the coupling and the position of the welds.

The idea of using this item is to minimize the length of time it requires to unscrew casing protectors when running long strings of casing. By the application of the method described all that is necessary is to release the spring and the casing protector comes off instantly without having to unscrew it. The spring has sufficient tension to provide maximum protection to the casing threads and will not slip until released. Drawings indicate how to construct such a casing protector.

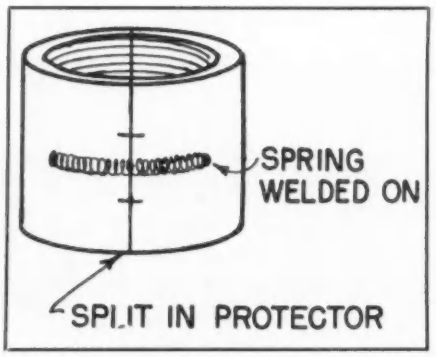
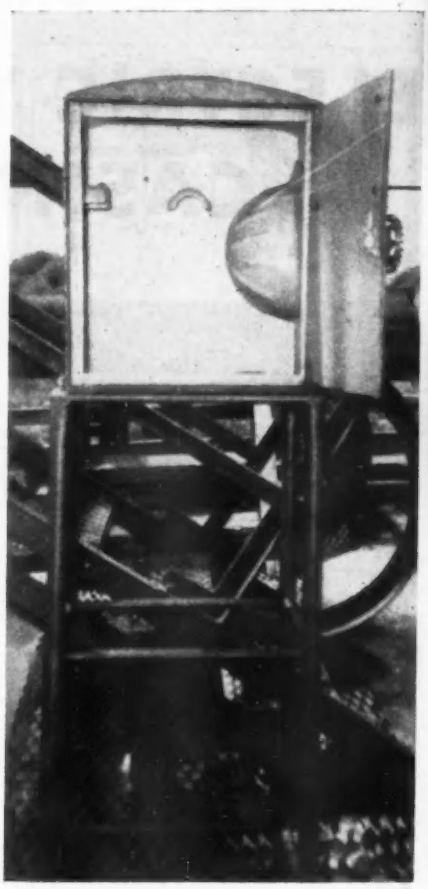


FIGURE 2



Metal Box Keeps Hats Accessible to Rig Floor

As a reminder to wear a safety hat before going on rig floor and also for convenience to rig visitors, a Gulf Coast contractor has built a small metal safety hat box and mounted it close to the derrick floor ladder.

The box can be made from sheet metal and mounted on a four-legged stand. Semicircular pieces of pipe are welded to the three inside walls as hat hangers.

Counterweight of Pipe Aids Derrickman's Climb

Make a counterweight of scrap pipe and mount rollers on it so it will ride a guy wire and make the derrickman's climb easier.

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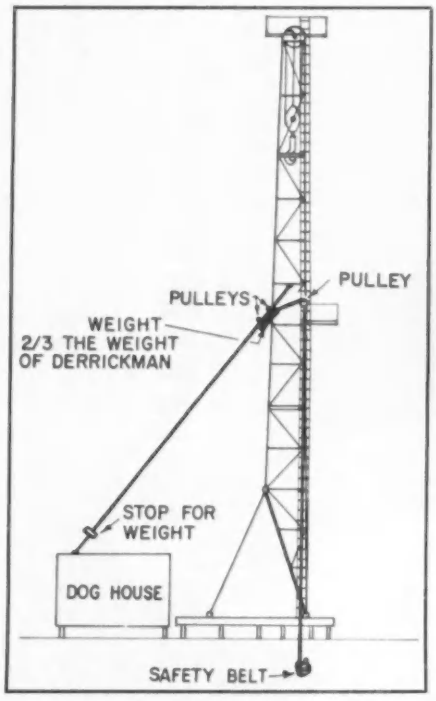

down, it more or less pulls him to the board.

Coming back down he merely holds on to the derrick ladder and almost floats down. The cable is three-eighths inches. The weight is made by filling 7-inch casing with sand or shot pellets.

Tank Serves as Storage and Dispenser

One Gulf Coast drilling contractor has fabricated a steel lubrication tank which is unitized as a five-compartment lube oil dispenser and storage unit for the diesel hose. The tank is made of light grade sheet metal welded in a frame made of 1½-inch steel angle iron. Spigots to each of the lube oil compartments are welded at the compartment midpoint and connected to the 1½-inch valves as shown. Refueling openings are indicated on the top of the unit.

The upper section is mounted on a framework made of steel plate, and I-beam as shown. The space between the skid mount and the storage tank is used to store the refueling hose, and small rig accessories.

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Water-flooding and gas cycling affected by . . .

Horizontal Fractures in Thin Reservoirs

Part 1: Estimated performance of the five-spot pattern.

By **DR. PAUL B. CRAWFORD,** Texas Petroleum Research Committee, College Station, Texas

SINCE RESERVOIRS are being artificially fractured on a broad scale, it appears appropriate that studies be made to estimate the effect that fractures may have on water-flooding and gas cycling possibilities. The type of fractures which are created have been indicated to be vertical, horizontal and inclined. These fractures originate at the well and extend out into the reservoir for various distances. The orientation and length of the fracture is not known in every case; consequently, it possibly will be a difficult procedure to estimate the effect that an actual fracture may have on the flooding or gas cycling efficiency.

However, in order that some idea may be gained of the effect of fracturing, studies were made of circular horizontal fractures originating at the well bore and extending out into the reservoir for various distances. All fractures were considered to be circular and of the same radius at each well. This is an idealized condition, but the results may be of some value in estimating the effect fracturing may have on future oil and distillate recovery possibilities.

Analysis of problem. In conventional well networks such as the five-spot, line-drive, staggered line-drive, and seven-spot patterns, it has been demonstrated that substantially circular isopotentials exist near each well. This is especially true for the center well in the five spot pattern and seven-spot pattern even for large percentages of the distances between input and output wells. It is approximately true for other wells in the above system for approximately 20 to 25 percent of the distances between input and output wells. In studying these problems, circular horizontal fractures were simulated by thin copper disks located at the well or wells in a potentiometric model reservoir. Regardless of whether the fracture was on the bottom, in the center or on the top of the conducting electrolyte the isopotentials from the fracture to the opposite well were substantially undisturbed. It was also found that the isopotentials from the fracture to the opposite well were nearly identical to those for the case in which no fracture occurred.[1] This was as expected, inasmuch as the circular copper sheet which simulates the fracture constitutes a circular isopotential. Consequently, the isopotentials from the fracture to the opposite well were substantially the same. This, of course, is only true for thin reservoirs.

For the case studied, a thin reservoir is approximately 15 feet thick for a 10-acre well spacing, that is, the reservoir thickness divided by the well spacing equals $\frac{15}{660}$, or 0.022. The results from such a study also would apply to a thicker reservoir provided impermeable strata could be correlated from well to well and that such strata separated the pay at approximately 15-foot intervals.

Five-spot performance. The performance of five-spot water-floods has received a fairly intensive investigation during the past year. Hurst presented work on the five-spot waterflood for the case in which the mobility ratio was equal to one and discussed the growth and development of the oil seal ahead of the water-oil interface.[3] Dyes, Caudle, and Erickson presented work on the oil production after breakthrough as influenced by mobility ratio.[2] The combination of the above work has provided us with considerably more information on these patterns than we have had heretofore.

In reviewing the work of Hurst and others, it will be noted that the isopotentials at each well in a five spot pattern are substantially circular for a large portion of the distance from one well to the opposite well. Consequently, if circular horizontal fractures are created at each well, and if the reservoir is thin, then the creation of such fractures will not disturb the

This is the first of a series of articles to discuss the influence of horizontal fractures on the secondary recovery of oil from thin reservoirs. Each article will discuss different phases of the problem, including performance and sweep efficiencies of the five-spot pattern, the line drive and the staggered line drive. This is the result of extensive research performed with potentiometric models and sponsored by the Texas Petroleum Research Committee, directed by Dr. George Fancher.

remaining isopotentials to any significant degree.

Figure 1 shows the calculated water-flooding or gas-cycling performance of a horizontally fractured thin reservoir. The data apply to a ten-acre well spacing for a reservoir of thickness equal to or less than 15 feet. All wells are fractured to the radius shown on the figure. It will be noted that swept areas are given at various intervals in the fluid injection process which correspond to different percentages of the total area processed. This may also be a time coordinate, especially for gas cycling. If no wells are fractured, the swept area at breakthrough is expected to be near 72.3 percent.

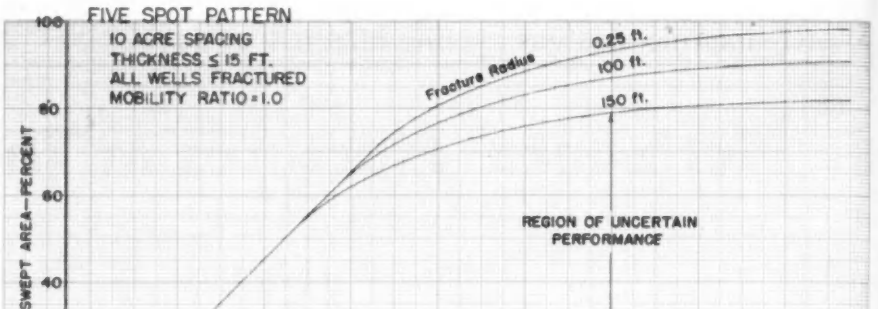


Fig. 1—Calculated water-flooding or gas cycling performance of a horizontally-fractured thin reservoir, based on ten-acre well spacing and a reservoir thickness equal to less than 15 feet.

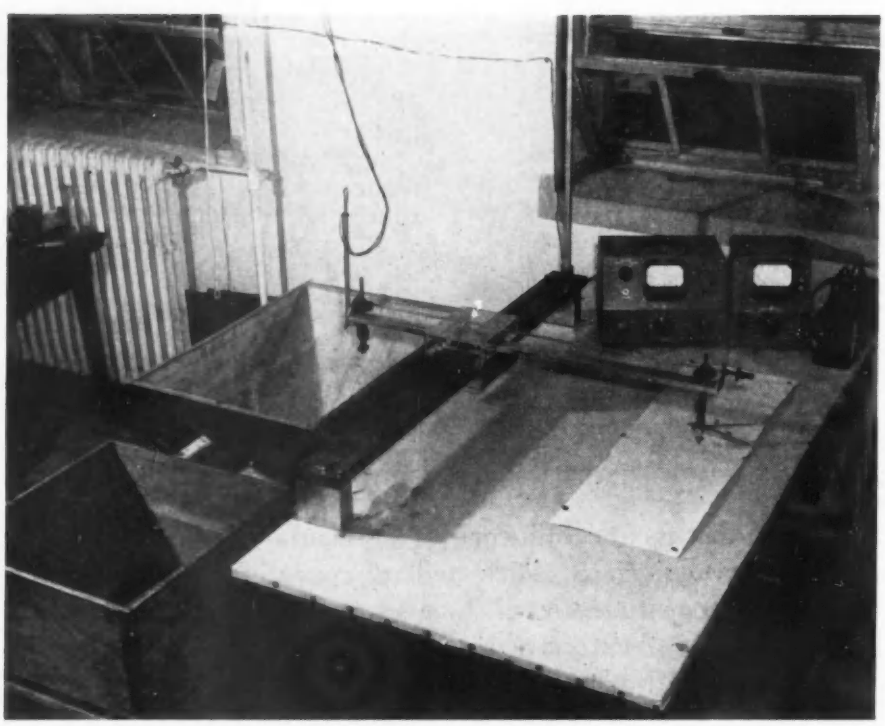
If flooding or cycling continues after breakthrough, it will be noted that when a fluid volume of 100 percent of the total area has been processed that the swept area is estimated to be near 87 percent, and when 140 percent of the area has been processed the swept area may approach 96 percent. If circular fractures of 100-foot radius exist at each well that breakthrough may be expected to occur when 65.1 percent of the area has been processed. After breakthrough the circular fractured system will be less efficient than the non-fractured system. For example, when a fluid volume corresponding to 100 percent of the total area has been processed the swept area is expected to be 82 percent. When 140 percent of the total area is processed the swept area is expected to be near 89 percent, and when 180 percent of the total area has been processed the swept area is expected to be near 91 percent.

For the case in which circular fractures of 150-foot radius exist at each well, breakthrough may be expected to occur when the fluid processed is equal to 56.1 percent of the total area. If 150-foot fractures exist at each well the resulting performance will be less efficient than the case for no fracture, or for fractures less than 150-foot radius.

When the percent total area processed is equal to 100, the swept area will be near 75 percent. When the total area processed is near 140, the swept area is near 81 percent.

Results of horizontally fracturing a thin reservoir will be to increase the quantity of fluid injected in order to achieve a given swept area at abandonment. For example, in order to achieve a 72.3 percent swept area for the case of no fracture, 100-foot fractures, and 150-foot fractures, the following fluid in percent areas must be processed: 72.3, 75.5, and 91 percent, respectively. Only a small additional quantity of water or gas must be handled to achieve 72.3 percent efficiency for the case of 100-foot fractures. However, approximately 30 percent more fluid must be handled to achieve the same efficiency if 150-foot fractures occur at each well.

If it is desired to achieve an 80 percent swept area for the no fractured case, then approximately 84 percent of the total area must be processed. If fractures of 100 and 150-foot radii exist at each well, the volume of water or gas for gas cycling processed must correspond to 93 and 128 area percent, respectively. That is,



POTENTIOMETRIC MODEL SETUP used to study the influence of horizontal fractures on secondary recovery of oil from thin reservoirs. Wooden reservoirs shown at left were used to study three dimensional flow in horizontally-fractured five-spot patterns.

in order to achieve the same recovery for the 150-foot fracture, approximately 50 percent more fluid must be injected than if no fracture had occurred. If fractures greater than 150-foot exist at each well, it is entirely possible that the swept area that will be experienced in the field will be highly erratic. This is to be noted on Figure 1. Considerable risk may be involved in securing fractures out to 200-foot radius or more. In the event interconnections occur between input and output wells, the swept area could be reduced to near zero. This is shown in Figure 1 where fracture radii of 330-foot at each well produce swept areas of near zero.

Conductivities of pattern. A possible advantage of horizontally fracturing each well is the benefit which is to be gained through an increase in conductivity of the pattern. That is, for a given reservoir, if horizontal fracturing occurs at each well, the quantity of fluid injected per unit imposed pressure differential may be from 2 to 10 times greater than for the unfractured case. This will depend upon the type of pattern and the radii of the fractures.

If all wells are fractured in the five-spot pattern to a radius of 100 feet, the conductivity of the pattern will be approximately 5 to 6 times greater than that for the case in which no fracture occurs. This means that if it takes 30 months to achieve breakthrough without fracturing, it will take approximately 5 to 6 months if fracturing occurs. If 150-foot fractures occur at each well, the conductivity of the pattern will be about eight times greater than that for the unfractured case.

On the above reservoir, the breakthrough time would be expected to be reduced to approximately 3 to 4 months. A 100-foot fracture at each well may be expected to reduce the breakthrough time by a sufficient amount that it may be feasible to process the additional quantities of water or gas required to give large swept areas even in less time than would be required if no fracture had occurred. For example, to achieve an 80 percent swept area, as cited above, it would require 84 percent of the total area processed if no fracture had occurred, and 93 percent if 100-foot fractures had occurred. Although the quantity of fluid required is greater, the conductivity of the pattern with 100-foot fractures is approximately five times greater; consequently, the required fluid could be handled and the swept area may be increased to a high level for this particular system.

For the case of 150-foot fractures, the quantity of fluid which must be handled is equal to 128 percent of the total area. However, the conductivity of the pattern is approximately eight times as great; consequently, even this system might conceivably be flooded or cycled to a large swept area in less time than it would require if no fractures had occurred.

Discussion and conclusion. The work which is presented here shows the estimated water-flooding and gas cycling performance of horizontally fractured thin reservoirs for the five-spot pattern. It is shown that for the case of 100 and 150-foot fractures that the swept areas will be less by from 2 to 15 percent than the unfractured case, depending upon the percentage of the area processed and the radius of the fracture at each well. It is shown that in order to achieve the same swept areas for fractured patterns as is received for the unfractured patterns more fluid must be handled. These quantities of fluid increase as the fracture radii increase. It is also pointed out that the conductivity of the fracture system increases very rapidly as the fracture radii increase. Fractures of 100 to 150-foot radius may result in conductivities of 5 to 8 times that of the unfractured system. Consequently, it may be possible to handle the required fluid and still achieve more satisfactory swept areas than could be obtained with the unfractured patterns.

Fractures greater than 150 feet at each well in a 10-acre spacing may be expected to produce highly erratic results. If interconnections occur, the swept area may be expected to be reduced to near zero. In such cases, even the injection of large quantities of water may still result in very low swept areas after breakthrough.

If evidence is available to indicate that fractures of such magnitude exist in reservoirs which are to be water flooded or gas cycled, it is suggested that studies be made and that possible remedial action be taken to reduce the radius of the fracture. In some instances it may be desirable to plug the fracture back to a radius of 100 feet or less, or to plug the fracture completely and introduce a new fracture of 100 feet or less. Other preliminary work which is not shown here indicates the desirability in some instances of fracturing to approximately 30 to 50 feet at each well for a ten-acre spacing. This results in a good swept area both at and after breakthrough, a three to fourfold increase in pattern conductivity and less element of risk in creating fracture interconnections.

About the Author

PAUL B. CRAWFORD received his B.S. from Texas Tech and M.S. and Ph.D. in chemical engineering from the University of Texas. From 1943 to 1947 he was engaged in the study of catalytic cracking of gas oils with natural and synthetic catalysts for American Cyanamid and The University of Texas. In 1947 he was employed by the Magnolia Petroleum Company Field Research Laboratory, and worked on the In-Situ Combustion Recovery Process. He is the inventor of several innovations of this process. In 1952 he was employed as an Assistant Director of the Texas Petroleum Research Committee and assigned to the A. and M. College Division. He is a member of the A. and M. graduate faculty and is a registered professional engineer.

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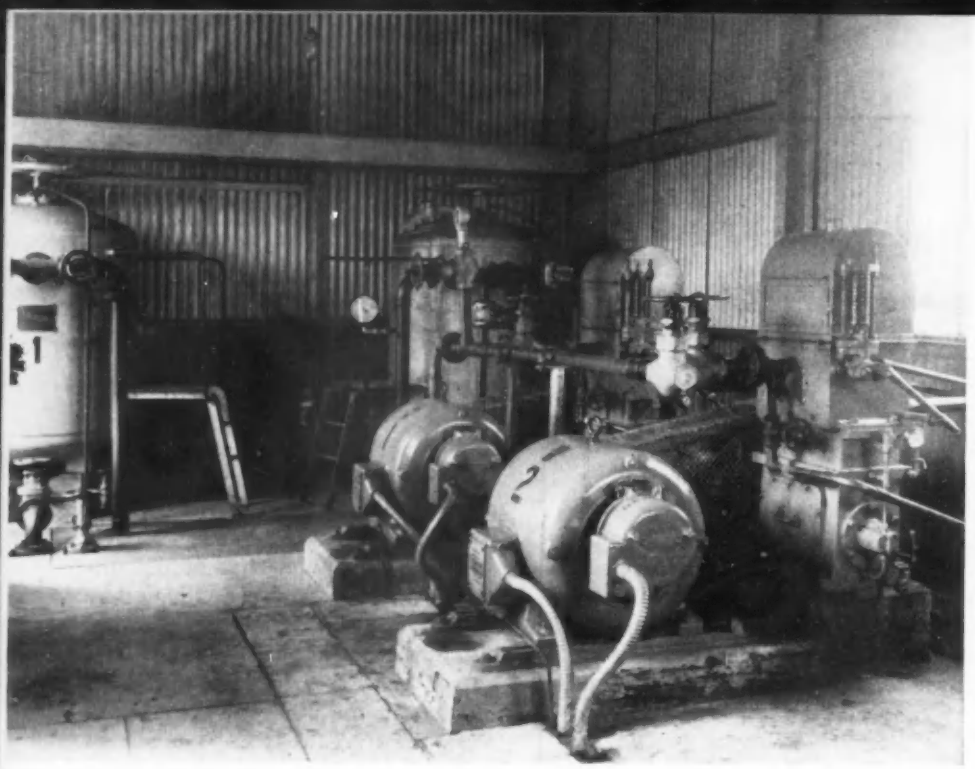
ACKNOWLEDGMENT

The author thanks Dr. George H. Fancher, Director of Texas Petroleum Research Committee, for encouraging this research project, and the Research Committee for permission to publish the results in this and the following series of papers.

TO BE CONTINUED



INTERIOR OF PUMP HOUSE at one of Great Britain's oil fields, showing electrically-driven, vertical injection pumps. These pumps have a capacity of 1000 barrels of water per day at 1700 pounds per square inch.

English Water-flood Methods Increase Oil Recovery

Begun early in 1948, the program will soon include the last of Britain's four commercial oil fields. Results have been good; techniques similar to ours.

CRUDE OIL PRODUCTION in England, although small, has been increased from 465 barrels per day before flooding, to an estimated 1200 barrels per day. This is the result to date of the application of modern water-flooding techniques to three of Great Britain's four commercial oil fields.

The fields are located in Nottinghamshire in the heart of England (Figure 1), and include Eakring, discovered in 1939; Duke's Wood, the larger reservoir to the south of Eakring and separated from it by a saddle area; Kelham Hills, some seven miles southeast of Eakring, both opened up in 1941. There is a small oil field at Caunton about three miles northwest of Kelham. Producing depths in the flooded Nottinghamshire fields range from 2000 to 2500 feet.

Water-flooded began at Eakring in 1948; at Duke's Wood in 1949, and at Kelham Hills in 1951. The Caunton water-flood is due to begin sometime in 1954.

Reservoir rocks in the Nottinghamshire fields are basal Coal Measures and Millstone Grit series sandstones. The oil has collected in small anticlines on a general regional uplift in the Carboniferous. The main producing sand is the Rough Rock, top member of the Millstone Grit. Porosities average 10 to 15 percent, and permeabilities are usually low.

The reservoir sandstones have only short vertical oil columns, varying between 50 and 200 feet. Owing to the low permeabilities, particularly in the Rough Rock, the original connate water was of the order of 50 percent of the pore space. There is no active water drive in the Rough Rock and primary recovery of oil is by dissolved gas drive. Saturation pressure of the gas in the oil is low, being about 390 pounds per square inch at Eakring, and only about 100 pounds per square inch at Kelham Hills. This compares with original reservoir pressure of about 1000 pounds per square inch.

The position of the oil fields in relation to surface features is shown in Figure 2. This is an underground contour map of the top of the Rough Rock on which has been superimposed some topographical detail.

The approximate producing areas are—Eakring and Duke's Wood, 600 acres with 163 producing wells; Kelham Hills, 180 acres with 48 producers and Caunton, 50 acres with 11 producers.

After the four fields were fully developed, production and bottomhole pressures declined rapidly. Peak production was about 2400 barrels daily in mid 1943. Production history of the three principal English oil fields is shown in Figure 3. Note that since water-flooding commenced in 1948, that annual oil production has been well maintained. Through 1953, an estimated net gain in production was about 670,000 barrels as a result of water-flooding.

From the reservoir performance of the Rough Rock it is estimated that about 20 percent of the oil originally in place would have been recovered by primary methods. Laboratory experiments on cores indicate a total recovery of about 40 percent could

Fig. 1—England's oil fields, three of which are being water-flooded, are located in Nottinghamshire where the legendary Robin Hood lived as an outlaw.

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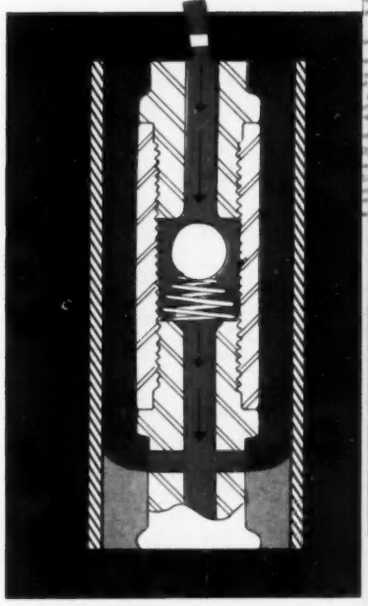

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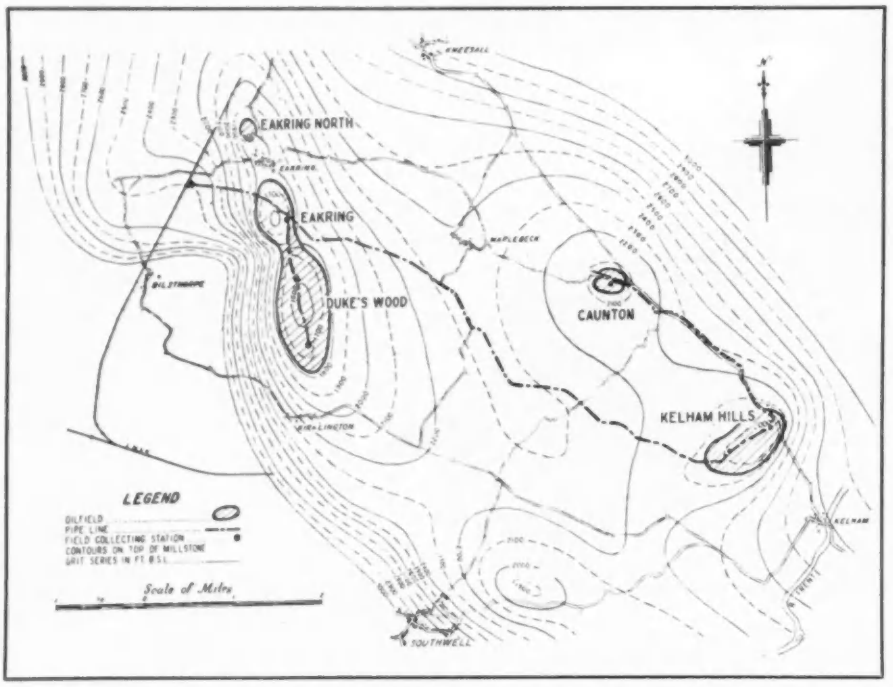

Fig. 2—Structural features of England's oil fields. Contours are on top of the Millstone-Grit series.

be expected by an efficient water drive.

Pilot Flood. In planning the water-flood project for the Eakring field it was necessary to begin with a pilot flood to determine water injection capacities, injection pressures, etc. The pilot scheme began in August, 1947, pumping about 300 barrels of water per day to a well which had been drilled below oil-water level in the Rough Rock early in the life of the field. A second well, also in the water zone, at a distance of about 800 feet, was used as a pressure observation well.

Results of the pilot flood were sufficiently encouraging to go ahead with a full-scale flood at Eakring. Injection wells were located around the periphery of the field. The flank method of water-flooding was chosen instead of pattern flooding to have the minimum number of water injection wells. Drilling is costly at Eakring mainly because a full string of casing has to be cemented to the base of the Coal Measures to protect an active coal field.

Flood System. The "closed-system" of water injection was adopted as production arrangements were such that all separated water could be readily kept out of contact with the air and used for injection purposes. Sufficient oxygen free "make-up" water for injection requirements is also available.

Figure 4 is a diagrammatic layout of the water-flood plant. The system is simple and has operated satisfactorily for six years at Eakring. Similar systems, differing only in minor details, have been installed at Duke's Wood and Kelham Hills. Fluid production is pumped by deep well pumps to a water knockout device operating under pipe line pressure and thence to emulsion treaters shown in Figure 5. The air-free water is collected in a storage tank and pumped by a centrifugal pump through a pressure sand filter (Figure 6) to a clear water storage tank. The make-up stream of air-free water is pumped from a well about 500 feet deep, drilled into the Bunter sandstone. This

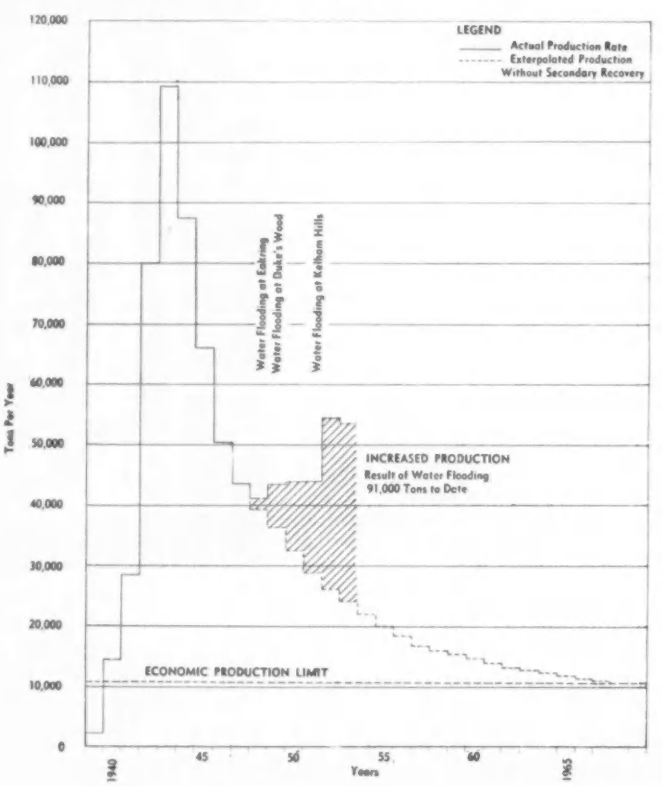

Fig. 3—(Left) Composite production history of Eakring, Duke's Wood and Kelham Hills fields showing results of water-flood program.

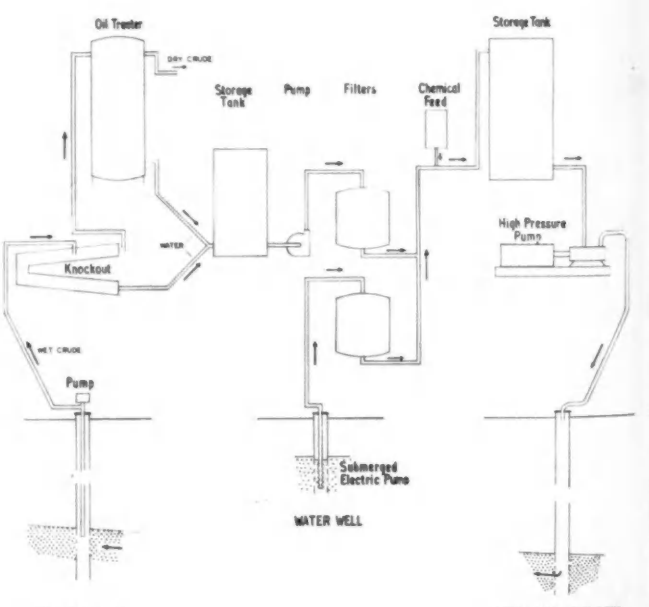

Fig. 4—(Above) Schematic diagram of water-flood system in operation in England's oil fields.

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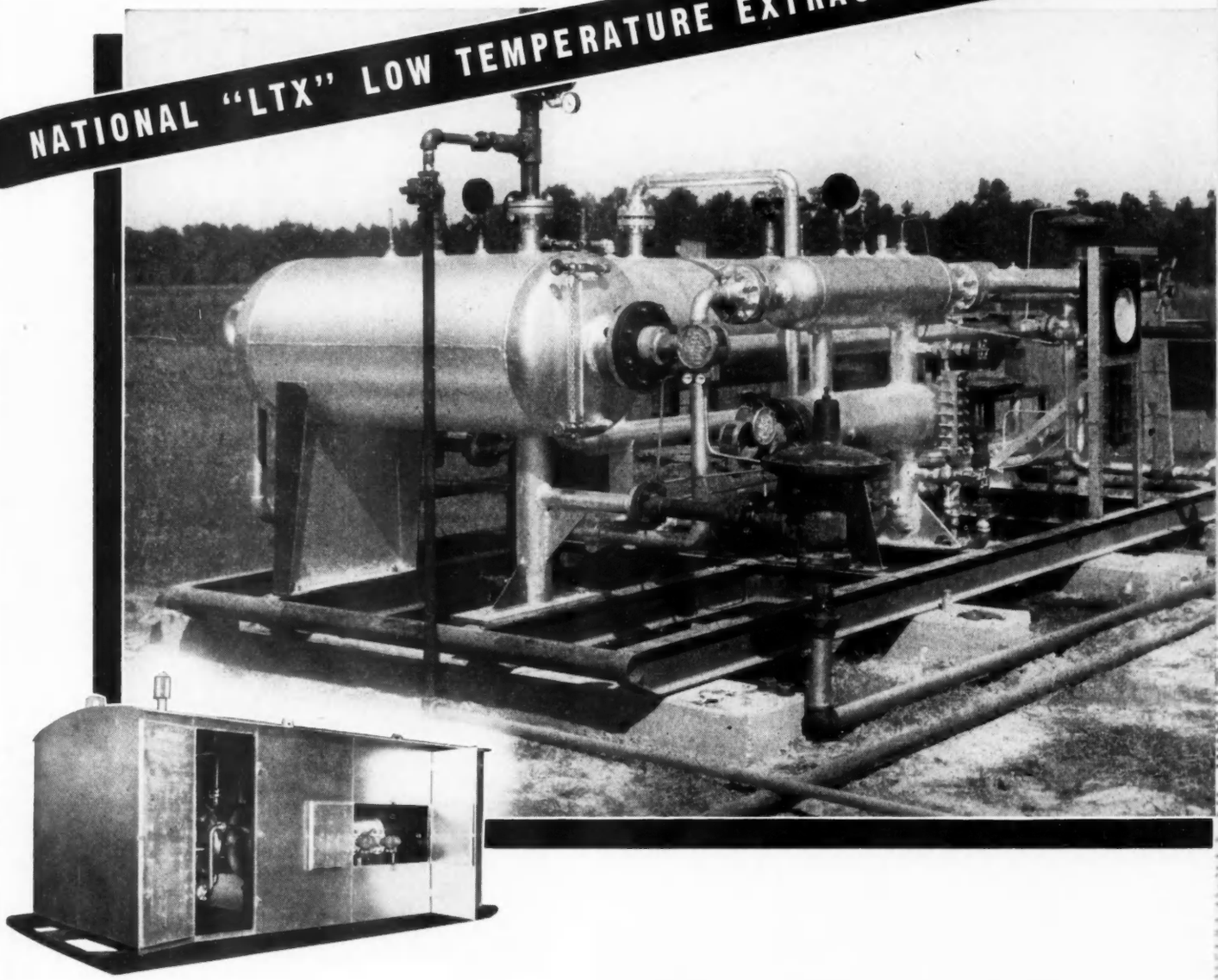

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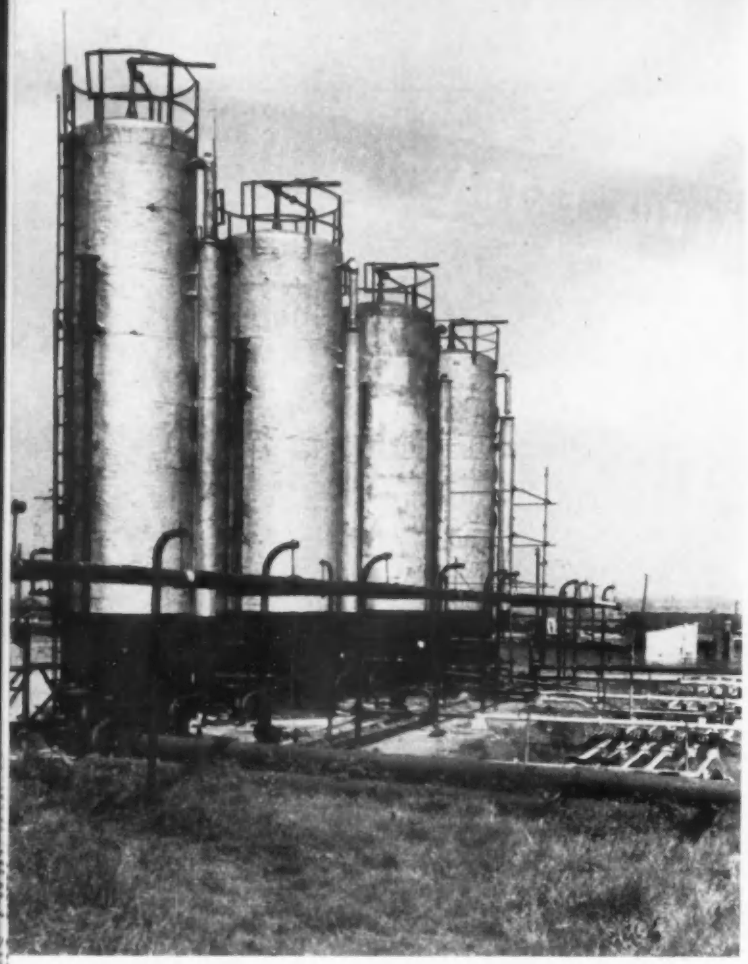

Fig. 5—Battery of four upright heater treaters which handle fluids from water knockouts operating under full line pressure.

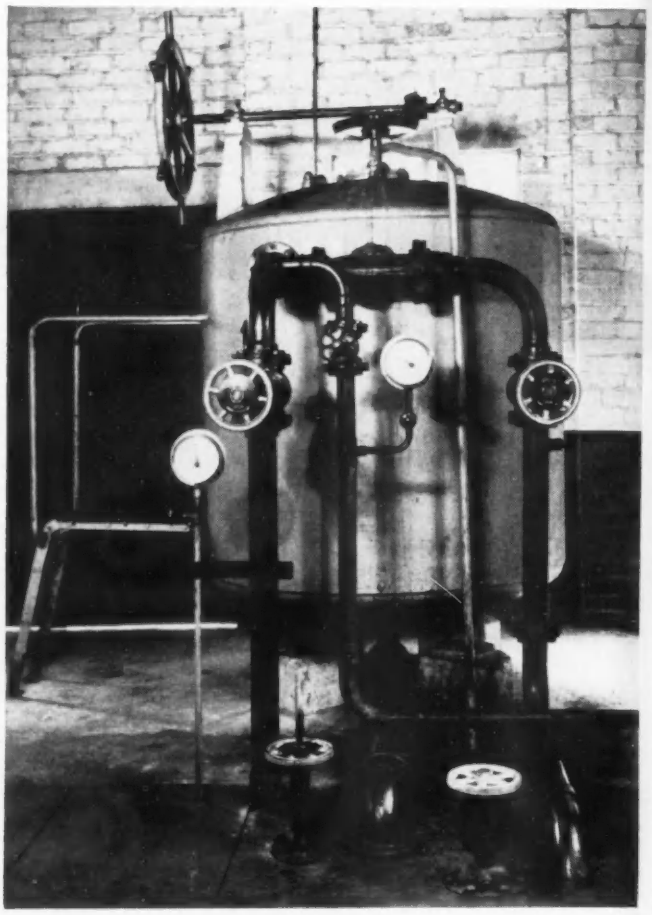

Fig. 6—Type of filter used in the closed water-flooding system. Connections are provided for back washing the filters.

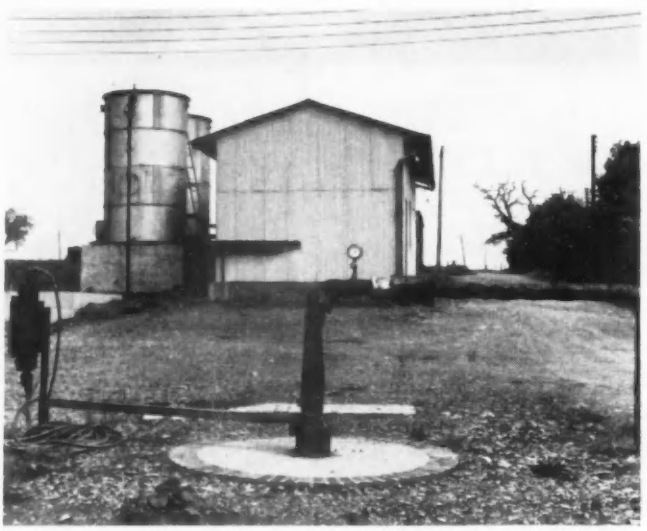

Fig. 7—Plant facilities for the water-flooding project include the pump house, sealed water storage tanks and make-up well.

Fig. 8—Wellhead layout at an injection well, showing provisions for controlling flow and metering the water to each well.

water is pumped, when required, by a submerged electric pump directly through a second sand filter to the clear water storage tank. Capacity of the latter is 120 barrels and serves as a suction tank for the high-pressure injection pumps.

Figure 7 shows the pump house, clear water storage tanks and "make up" water well.

The first water injection pumps consisted of horizontal triple ram pumps which had been used in Operation Pluto (pipe line under the ocean) for pumping gasoline to France

during World War II. Recently, vertical triplex ram pumps have been installed. The only size available in Britain has a capacity of 1000 barrels per day at a discharge pressure of 1700 pounds per square inch.

Injection Wells. Water injection wells are either wells which have been drilled specially for this purpose, or they are production wells which have gone to water. The wells are cased with 6⅝-inch casing, leaving the Rough Rock as the injection horizon.

Figure 8 shows the wellhead arrangement at an injection well and provision made for metering the water. Injection capacities vary from around 10 to 1000 barrels per well per day.

Summary. Annual production figures without water injection (Shown in Figure 3) have been determined from the log-log production decline graphs for each oil field area. Waterflood statistics to Dec. 31, 1953, follow:

Water-flooding in operation	Eakring 6 years Duke's Wood 5 years Kelham Hills 2 years (Caunton due in 1954)
Water injection wells (drilled)	15
Wells gone to water and converted to injection wells	17
Total pumping wells	222
Total daily water injection rate	8000 bbls.
Total daily water production rate	5500 bbls.
Total daily fluid production rate	6700 bbls.
Cumulative fluid production	16,000,000 bbls.
Cumulative water injected	10,000,000 bbls.
Cumulative oil production	5,850,000 bbls.
Cumulative oil gained from water flooding	670,000 bbls.

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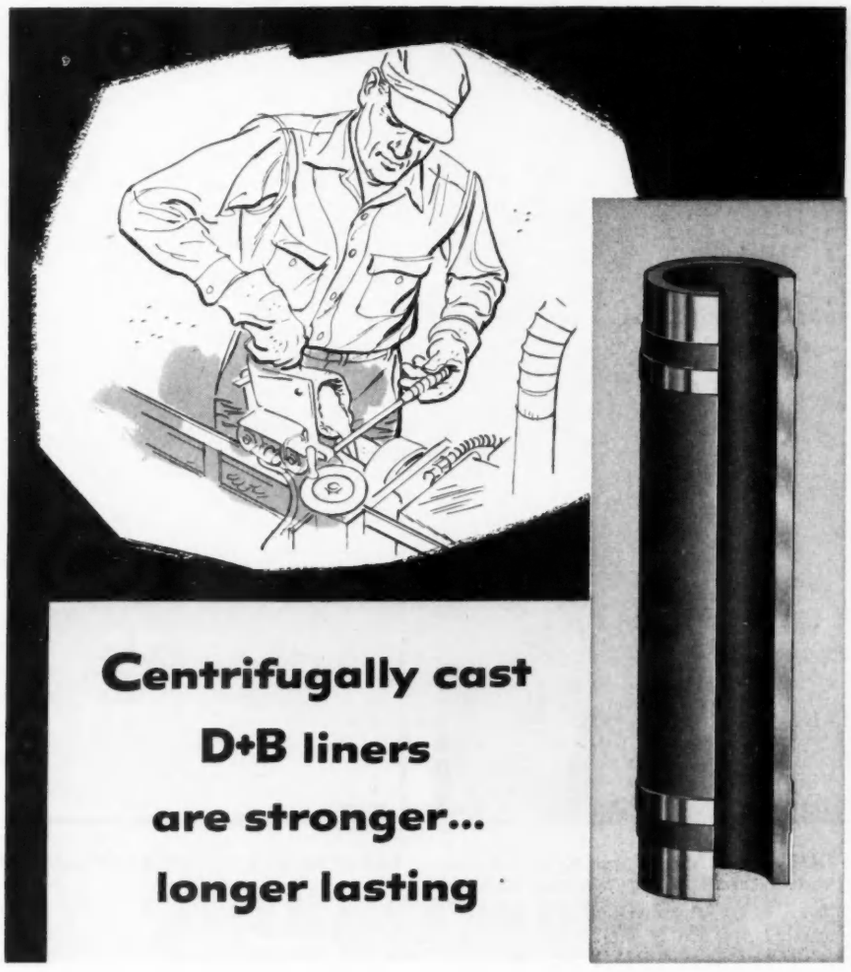

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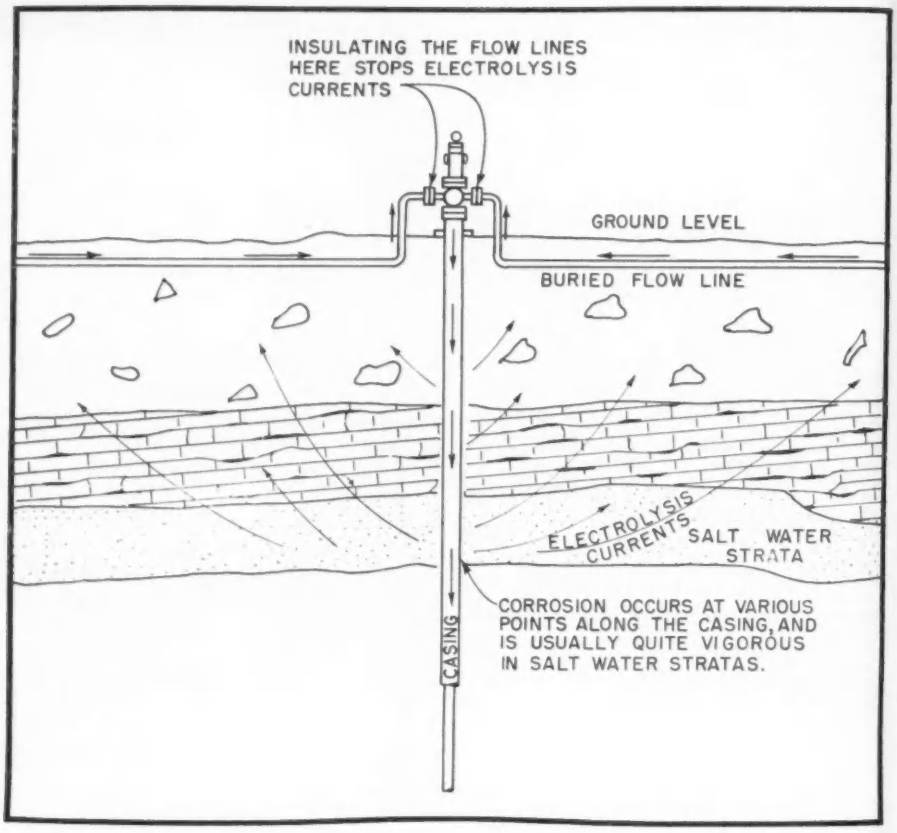
E-171

FOUR JOINTS at left are typical of what severe external casing corrosion can do.


INSULATING THE FLOW LINES HERE STOPS ELECTROLYSIS CURRENTS
GROUND LEVEL
BURIED FLOW LINE
ELECTROLYSIS CURRENTS
SALT WATER STRATA
CASING
CORROSION OCCURS AT VARIOUS POINTS ALONG THE CASING, AND IS USUALLY QUITE VIGOROUS IN SALT WATER STRATAS.

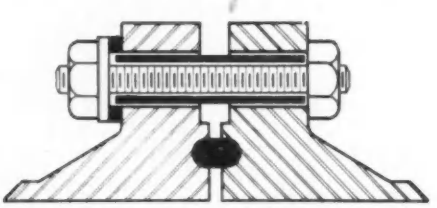
ELECTROLYTIC CURRENTS flow from casing to flow lines as indicated in this schematic diagram.

How to Combat External Casing Corrosion

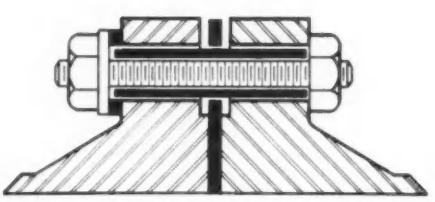
Losing 20 pounds of steel casing into the ground every year? That's what can happen if as much as one ampere of current flows from casing into adjacent formations. Here's what you can do about it.

By WAYNE A. JOHNSON, Corrosion Rectifying Company, Houston

WHENEVER A FLOW LINE is connected to a casing there is a strong tendency for the casing to become "anodic" to the flow line. That is, the casing discharges electrolysis currents into the ground. These currents are created due to several electro-chemical phenomena, one of the most important of which is "differential oxidation." The current goes upward through the soil to the flow line as shown in the accompanying diagram, travels back along the flow line to the christmas tree, and then back down the casing. The cycle is continuous, the casing being electro-positive with respect to the flow line (electro-negative). It is a simple battery-type circuit, with about 20 pounds of casing steel per year being deposited into the soil as oxides, for each ampere of electrolysis current present.



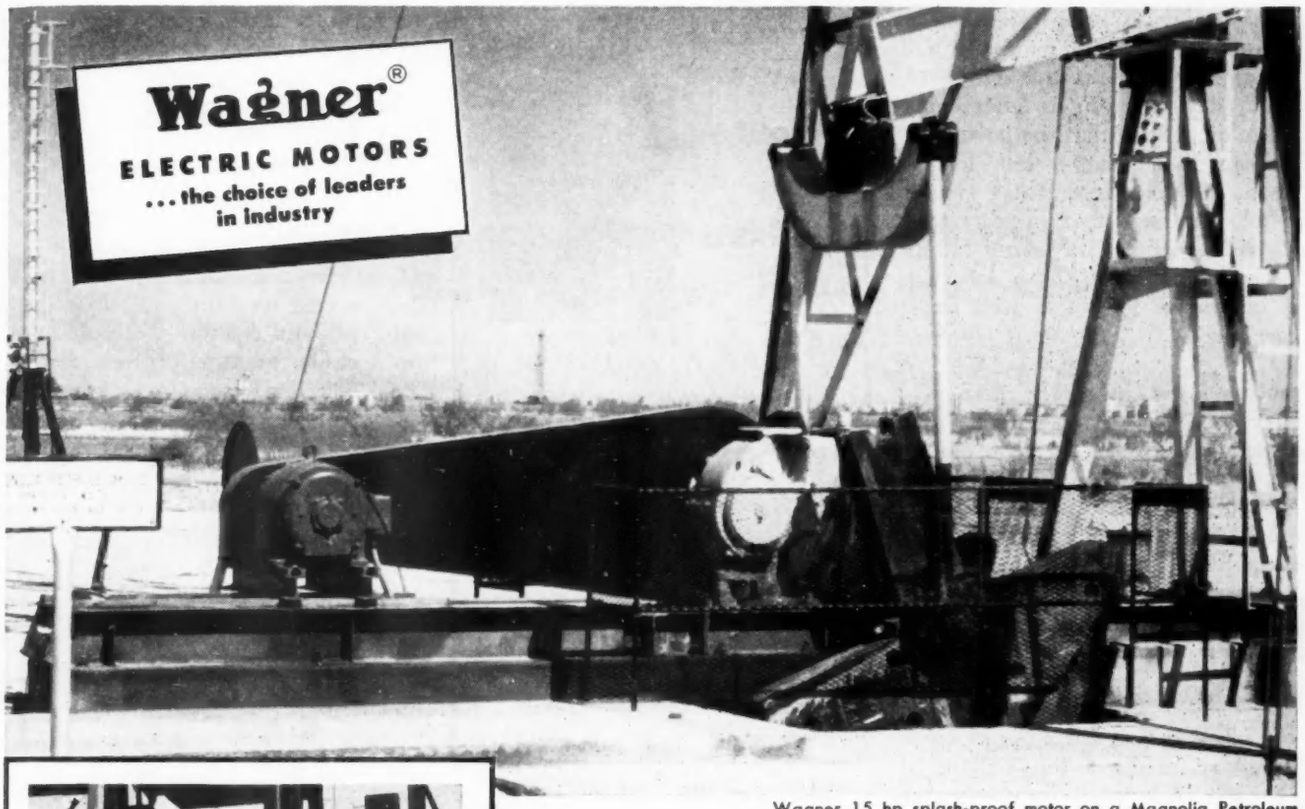
RING JOINT FLANGES may be insulated by use of an oval plastic ring, plastic stud sleeves and plastic washers as shown.



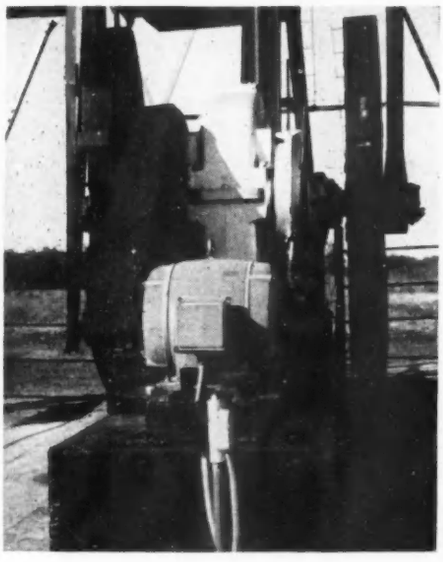
RAISED FACE FLANGES may be insulated by ⅛-inch thick central plastic gasket, plastic washers and stud sleeves.

It may easily be seen that if an ampere of current happens to be discharging from one linear foot of 20 pound weight casing a catastrophe is in the making. However, this is never the case. Usually this current discharge occurs over a considerable distance, with the load being distributed, though doubtless not evenly. Accumulated data indicates that most of such current is discharged in salt water strata. This is not always the case, but such situations are more prevalent.

It is superfluous to say that operating companies are concerned about casing corrosion. In the past there have been wells which were "flushed"



Wagner 15 hp splash-proof motor on a Magnolia Petroleum Company unit pumper in Lea County, New Mexico.



This Wagner 15 hp Type XP high torque splash-proof motor operates a unit pumper in Magnolia's Mankins No. 1 field, Shamrock, Texas.

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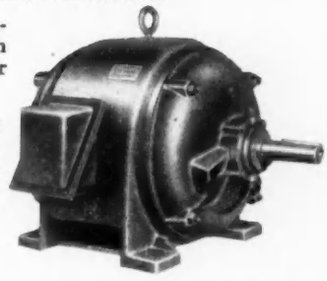

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in a short period, being exhausted of their oil and gas before corrosion had a chance to take its toll. However, present day prorating is lengthening the life of wells so that the down-the-hole investment must last longer. Present day wells represent a greater capital investment than in years gone by. Workovers due to casing failure cost upwards of $5000 per job with the occasional loss of a well being experienced.

Insulate Flow Lines. The most commonly used method of reducing the corroding electrolysis currents on casings is to electrically insulate all flow lines at the christmas tree. This "opens" the electric circuit and eliminates the "circulating" currents. It must be pointed out that other "local" corrosion cells might remain on the casing due to different factors, but at least this one important source for such corrosion has been eliminated. Cost of providing such insulation is negligible, usually a few dollars. It may be done by replacing the flange central gasket with an insulating material gasket, and slipping insulating sleeve and washer sets over the bolts to prevent them from touching the flanges. In some cases an "insulating union" is used. This union is a more recent approach, and offers some advantages.

In the case of ring joint type flanges the metal ring is replaced with a tough, plastic type ring. Pressures of several thousands of pounds are safely handled by either of these methods.

About the Author

WAYNE A. JOHNSON is owner of Corrosion Rectifying Company, Houston, which specializes in designing and installing cathodic protection systems. He was formerly with The Texas Pipe Line Company, and later with Cathodic Protection Service at Houston, as a senior corrosion engineer, prior to organizing his own firm. A graduate of Texas A. & I. College, Kingsville, he is an overseas Navy veteran of World War II.

Cathodic Protection. There are several schools of thought concerning the application of cathodic protection to provide external protection to casings. Several companies have conducted tests for a period of years without any definite conclusions as to whether such protection is feasible at depths greater than 2000 feet. Protective cathodic values have been definitely observed at this depth while applying "forced current drainage," i.e., cathodic protection, to casings. One group of writers[1] states that a 6-inch outside diameter casing was protected to a depth of 1500 feet by applying 1.5 amperes of cathodic current. A more recent test[2] indicated that definite cathodic changes were obtained on a casing at a depth greater than 3000 feet. One company is presently applying cathodic protection to a large number of casings in West Texas. It will probably require several years to learn the results of this comprehensive test, though it is generally rumored that good results are apparently being obtained with comparatively small amounts of cathodic current being applied.

There are two known ways to determine the value of applied cathodic current. The first is to have a "down-the-hole" electric log made, first without cathodic protection and then after applying cathodic protection. Plotting the resulting electric current values on a graph will indicate significant cathodic improvements in the casing. The other method is to apply the current and then wait a specified period of time and compare the performance of the casing with its previous record, or the record of older casings in the same area.

Conclusion. Past experience, though it has not provided overwhelmingly concrete evidence, tends to indicate that the following procedures are worthwhile:

- Electrical insulation of flow lines from the well heads. It is inexpensive, and advisable.
- A small amount of cathodic current, using several galvanic anodes or a small rectifier unit, is good insurance especially if a casing traverses a corrosive salt water stratum at depths no greater than 2000 feet.

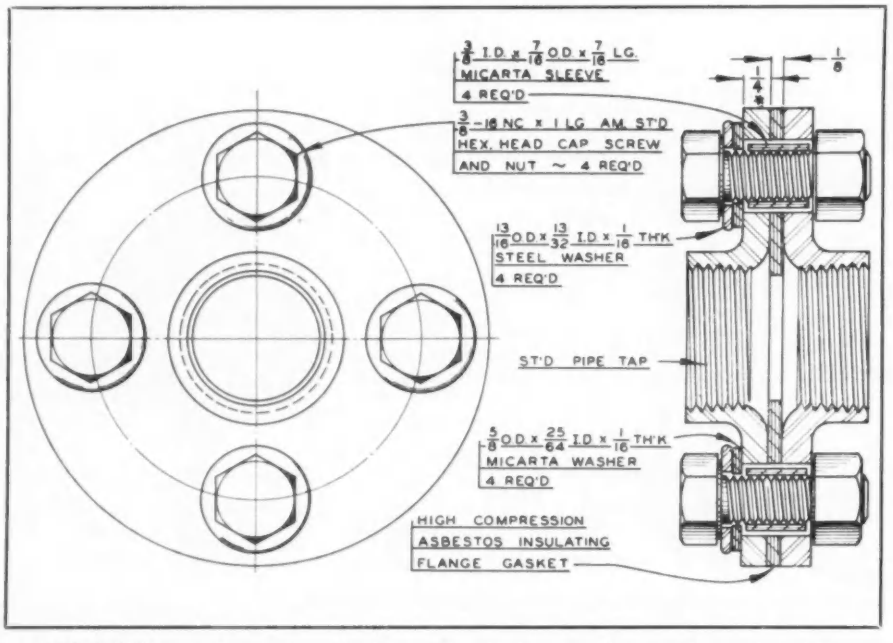
Continued testing by interested oil companies should eventually result in more concrete evidence as to the value of cathodic protection at various depths.

REFERENCES

[1] Corrosion, June, 1948.

[2] Lane Wells Survey, 1951.

—The End


3/8 I.D. x 7/16 O.D. x 7/16 LG. MICARTA SLEEVE 4 REQ'D
3/8-16 NC x 1 LG. AM. ST'D HEX. HEAD CAP SCREW AND NUT ~ 4 REQ'D
13/16 O.D. x 13/32 I.D. x 1/16 THK STEEL WASHER 4 REQ'D
ST'D PIPE TAP
5/8 O.D. x 25/64 I.D. x 1/16 THK MICARTA WASHER 4 REQ'D
HIGH COMPRESSION ASBESTOS INSULATING FLANGE GASKET
1/4
1/8

SMALL LINES may be insulated by flanged insulating couplings as shown here. Flanges are cadmium plated; gasket, sleeves, and washers are plastic. Steel washer also is used.

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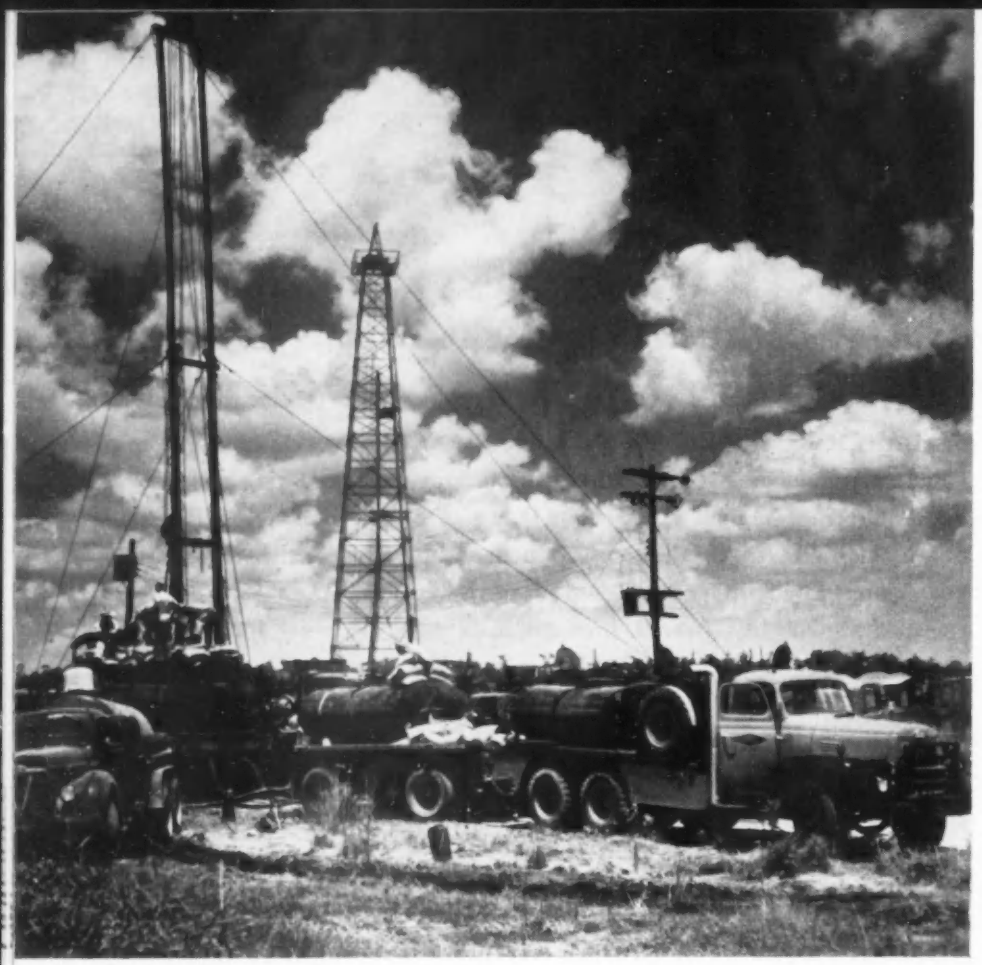


A GULF COAST WILCOX WELL undergoing hydraulic fracture treatment using the newer, finer sand.

Recent success and a new idea encouraging to . . .

Fracturing the Wilcox

Not a candidate for stimulation a year ago, this Gulf Coast problem formation responds to treatment.

By J. E. KASTROP, World Oil Staff

A modified technique of conventional hydraulic fracturing has shown considerable promise of increased production in the variable and erratic Eocene Wilcox formation of the Texas Gulf Coast. Records of those wells treated to date indicate substantial production gains, although all jobs have not been successful. However, the successes are so much greater than the failures that this new fracturing idea is finding increased application and may offer possibilities in other formations heretofore not considered for hydraulic treatments.

Only in the past year has the Wilcox been a likely candidate for hydraulic fracturing. This form of well stimulation, although tried and proven many times over throughout the U. S. and Canada during the past five years, was at first disregarded as a potential stimulant for this widespread petroleum source bed throughout the coastal oil area. Unusual, and in isolated cases, nearly phenomenal successes in stimulating production by this means in other oil areas prompted coastal operators to take a chance . . . a chance that hydraulic fracturing might help production in the stubborn Wilcox.

Many of the first attempts to fracture the Wilcox failed. In some cases, only a few barrels of the fracturing medium were displaced before the sand formed a bridge in the hole and had to be washed out. During these early trials, only a few jobs showed some promise, but not very much.

There was definite indication that the productivity of many Wilcox producers should be higher. It was felt that permeability blocks resulting from completion operations were a big factor in retarding Wilcox productivity. If fractures could penetrate these artificial formation barriers, permeability about the well bore could be restored, if not increased. Probably the most frequent purpose of fracturing the Eocene Wilcox is to increase the drainage pattern in zones of relatively low permeability.

Fracturing had worked in other areas, particularly in West Texas and Oklahoma, as well as most all oil-producing areas in the U. S. and Canada. After considerable study and investigation, it was found that the use of a smaller size sand grain as a propping agent caused fewer "screen-outs" or sand bridges. Field experience pointed to a sand grain, the diameter of which was about half that of the Ottawa sand which has found such success in other areas, and first used in the Wilcox.

Early Wilcox treatments utilized the Ottawa flint shot sand, which is from 20 to 40 mesh, or .033 to .016 inches in diameter. Air permeability of this sand was about 105 darcys. The smaller sand now used successfully, and one which has resulted in very few screen outs, is the St. Petersburg sand that comes from the same geological formation as the Ottawa sand. It is about half the size of the latter, being from 40 to 60 mesh, or having a diameter of .016 to .010 inches. Its air permeability is 42 darcys.

The use of a smaller size propping agent and more of it per gallon of carrying agent has been the key to recent fracturing successes in the Wil-

cox of South Texas. Procedures are essentially the same as those employed in former fracturing treatments. Although this new idea permits the displacement of smaller sand into the formation, there are other factors to be considered when fracturing the Wilcox.

A look at the Wilcox. Because this formation is so vastly different from other oil and gas bearing sandstones, it has been a genuine challenge in many ways. The Wilcox came into prominence in the late 1930's with the discovery of such fields as Segno, Ace, and Joe's Lake in Texas, and Ville Platte and Eola in South Louisiana.[1] The early exploration activity died off as quickly as it boomed as more and more dry holes were drilled in the Upper Wilcox. The Lower Wilcox was not penetrated on the theory that if the Upper was dry, so was the Lower zones.

It was about ten years later that important discoveries in the Lower Wilcox heralded another exploration boom that continues even today. It was found that the Lower Wilcox had more favorable possibilities than the Upper zones. A large shale section separates these two Wilcox zones. Top of the Wilcox ranges in depth from 5000 to 10,000 feet subsea.

Core analysis of a typical Wilcox condensate well is shown in Figure 1. Presence of lignite above the productive horizon and the increase in permeability at the base of the sand before going into shale are two common characteristics. Impermeable sandstone streaks, appearing in the center of the horizon cored is also a typical occurrence.

The lithology shown in Figure 2 with scattered shale breaks is common in Wilcox oil sands. Gas caps are prevalent in most Wilcox oil reservoirs which usually are fully saturated. Average gravity is about 41 degrees API and the gas-oil ratios vary from 750 to 1100. Due to the lenticularity of Wilcox reservoirs, water drives are not considered to be very effective.

Many wells have been completed in large transitional zones frequently encountered in the Wilcox. These zones

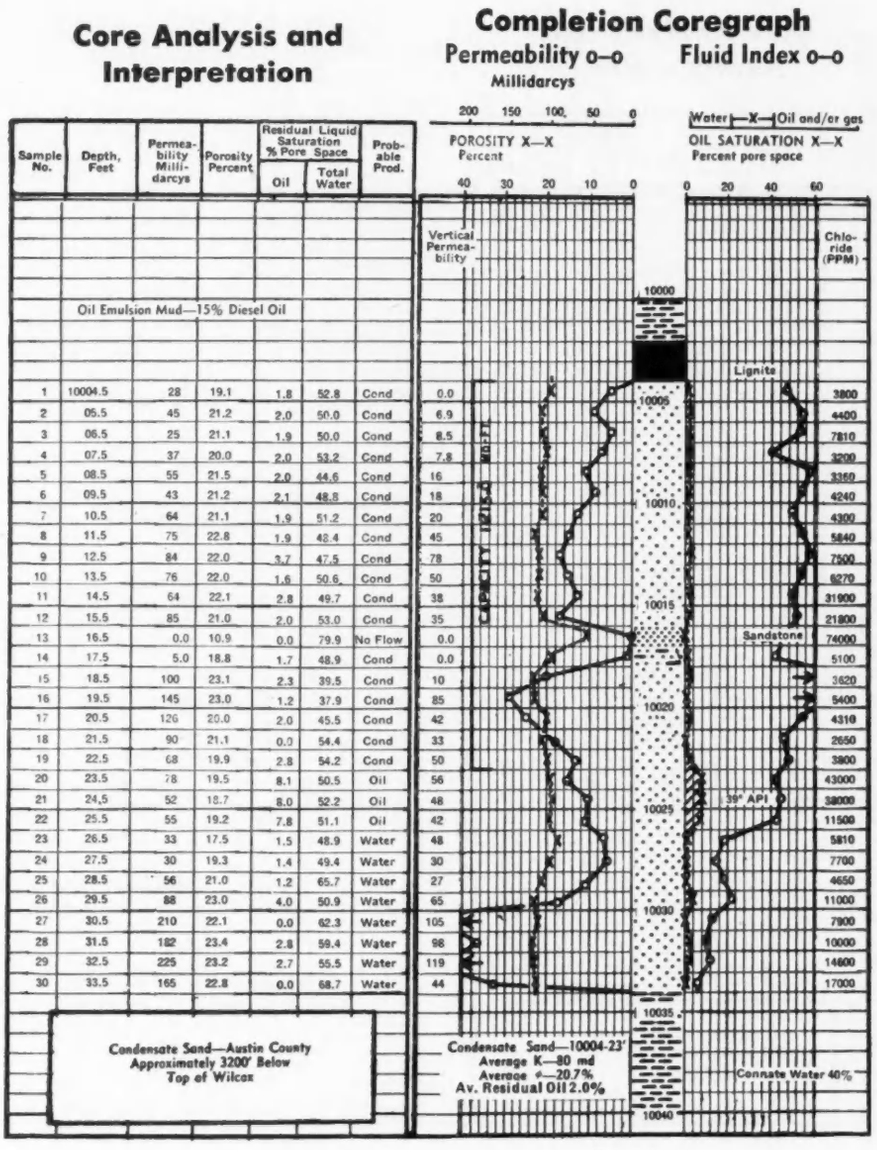


Fig. 1—Core analysis of a typical Wilcox condensate well in Austin County, Texas.

are characterized by irregular oil saturations and occasional high total water content. They are said to be zones that are not in equilibrium and where the connate water still is movable under pressure drops that effect production into the well bore.

Fracturing obstacles. There are several obstacles in the path of ideal fracturing operations in treating the Wilcox formation. Perhaps the most objectional feature so far as hydraulic fracturing is concerned is the erratic nature of the Wilcox. It is unusual indeed to find a homogenous sand layer of appreciable thickness throughout the several thousand feet of Wilcox deposition. Throughout these deposits are layers of shale which vary in thickness and in number. Some of the layers may be but a fraction of an inch in thickness (Figure 3) with alternate layers of sandstone of varying thickness. The variation from shale to sandstone in a short interval is common.

In the sandstone sections, there is a wide variance in permeability. Figure 4 shows two cores taken from the New Ulm field in Austin County, Texas. The one at left came from about 10,468 feet in a zone of radical change in permeability which ranged from 120 to 382 millidarcys in a 10-foot interval. Note the chunk of clay imbedded in the core. This is not a mud cake off the wall of the hole, but actually a chunk in the matrix. It is

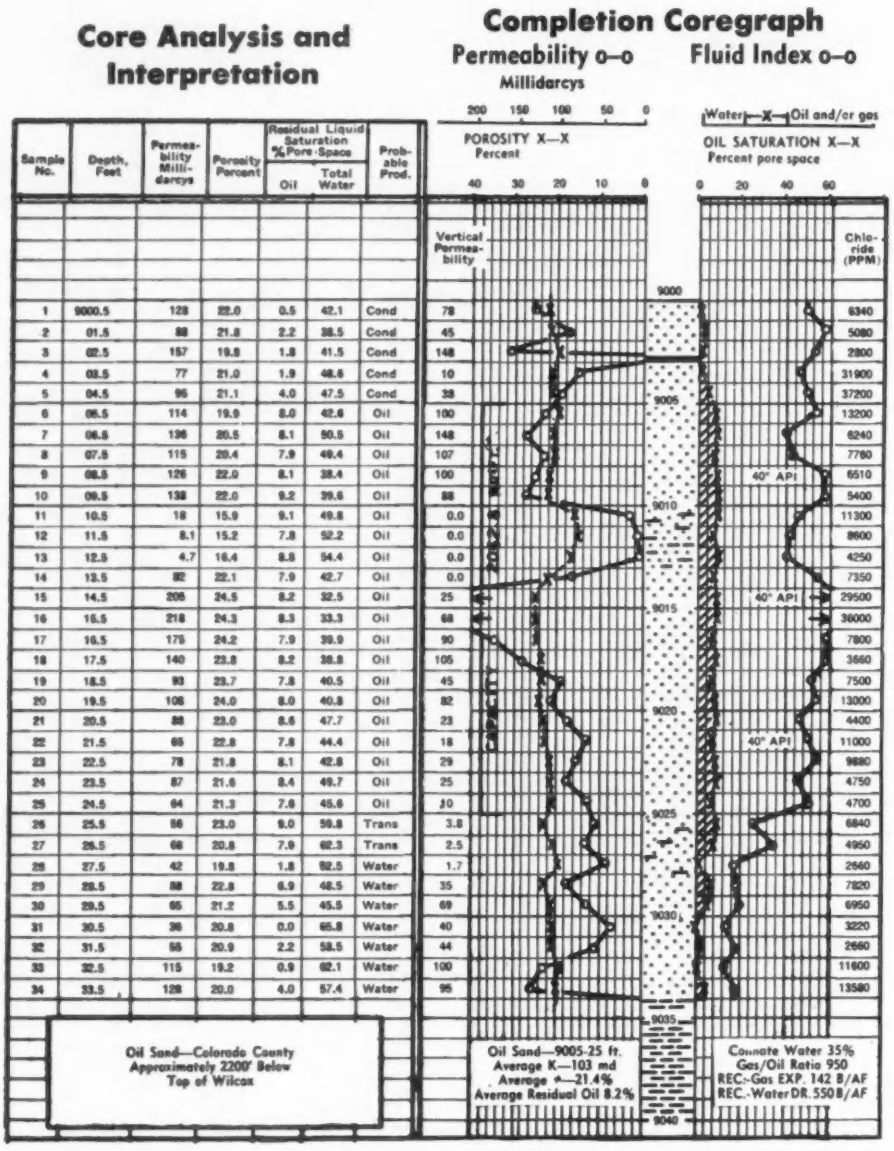


Fig. 2—Core analysis of a typical Wilcox oil-producing well in Colorado County, Texas.

rather common in this zone in the New Ulm field.

To illustrate quite graphically the radical change in lithology so typical of the Wilcox, just compare the two cores in Figure 4. The one at left, discussed above, came from 10,468 feet. The core at right, with a permeability less than 1 millidarcy, came from 10,475 feet . . . just seven feet deeper in the same well! This latter core shows the intensity of shale interbedding with sandstone. Shales such as typified here as quite dense.

The erratic nature of some sections in the Wilcox is illustrated in Figure 5 which is a core from the New Ulm field. Note the presence of large white chunks which cause occasional zones of weakness.

Vertical fracturing, although some are doubtful of its existence in the Wilcox, has its objectional features in hydraulic fracturing. While quite desirable in the highly interbedded sections of a saturated oil zone, vertical fractures are sources of disappointments when they occur near the water-oil or gas-oil contact. Therefore, it is essential that the interval to be fractured be carefully selected to minimize the risk of breaking through to water or gas.

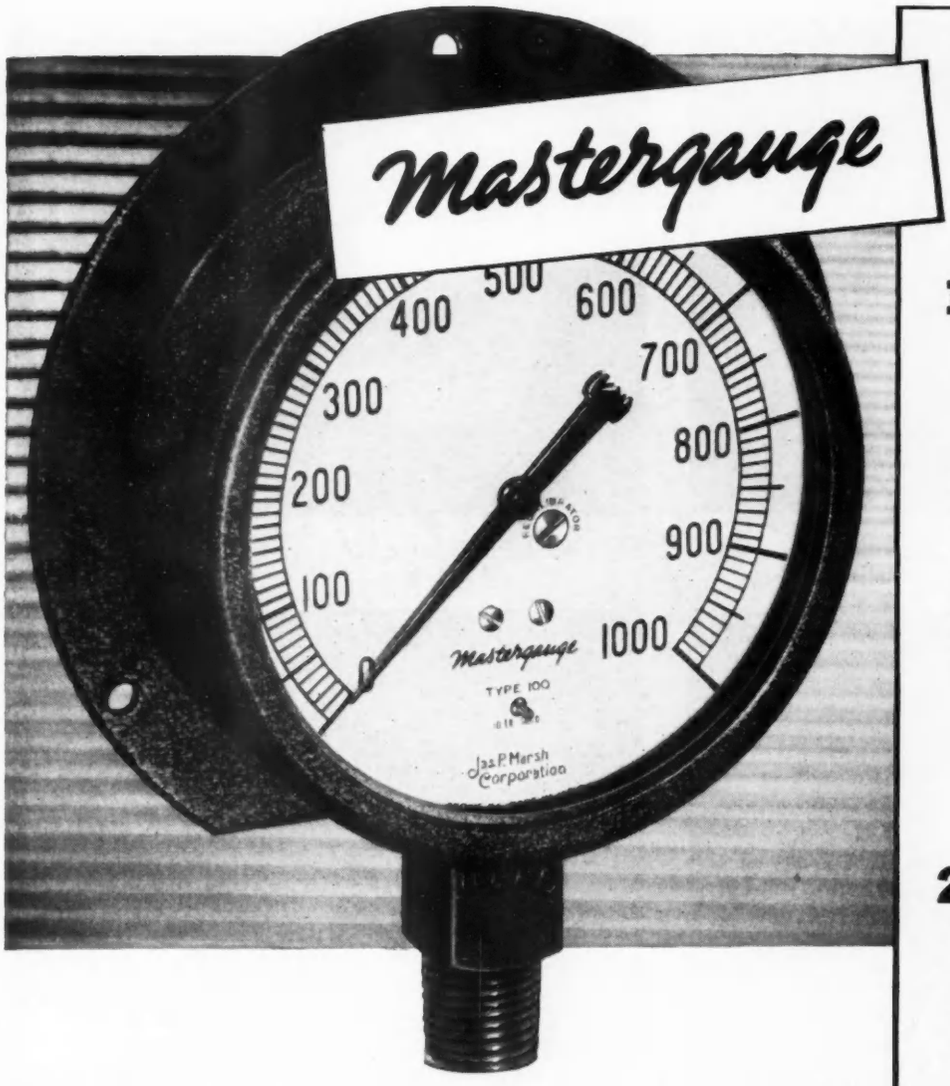
Figure 6 is a cored section of the Wilcox showing a vertical fracture. It is a recent contention that such vertical fractures as indicated here might be made during the coring operation. At some risk of involvement

TABLE 1

Summary Data Sheet on Recent Wilcox Fracturing Treatments in South Texas

County	Perforated Interval	Gallons Acid-Gel.	Sand Pounds/Gal.	Maximum Injection Press. PSI	Maximum Injection Rate Bbls/Min.	PRODUCTION		Remarks
						Before	After	
Austin	9233–14	4000	1.3	4500	2.0	36 BOPD (Swab)	80 BOPD	Leveled off at 35 BOPD–Flowing after 60 days.
Austin	9736–55	4000	1.5	3700	3.0	Show	2.5 MMCF/D	Plus 75 BCPD on ¼" Choke–75 Percent water.
Bee	6568–78	2000	1.0	3600	2.0	9 BOPD	50 BOPD	
Colorado	9059–70	2000	3.0	4100	3.0	18 BOPD (Pumping)	100 BOPD (Flowing)	
Duval	7045–7152	2000	1.0	3400	3.5	3 MMCF/D	20 MMCF/D	
Duval	*6960–7134	5000	1.0	4300	2.5	1.5 MMCF/D	8.4 MMCF/D	
Duval	†7036–7206	5000	1.0	3500	3.0	1.0 MMCF/D	17.5 MMCF/D	
Duval	8152–72	3000	2.0	4450	2.0	1.0 MMCF/D	2.0 MMCF/D	
Duval	7080–7094	5000	2.0	4200	1.5	285 MCF/D	650 MCF/D	
Duval	†7098–7197	5000	1.0	3800	2.5	2 MMCF/D	4 MMCF/D	
Duval	7050–7210	5000	2.0	4350	3.0	0.5 MMCF/D	2.3 MMCF/D	
Duval	7485–7540	4000	1.0	4400	3.0	72 BOPD plus 4 MMCF/D	140 BOPD plus 8 MMCF/D	
Dewitt	8297–8302	1000	1.0	4700	2.5	0 BOPD	48 BOPD	
Dewitt	8540–64	2000	2.0	4800	3.0	1.3 MMCF/D	6 MMCF/D	
Dewitt	7780–7816	5000	3.0	3900	4.0	Show	14.5 MMCF/D	
Dewitt	8144–72	7500	2.0	4000	3.0	Show	12.5 MMCF/D	Went to water
McMullen	7670–80	2000	1.0	4200	2.5	60' oil DST	7.6 MMCF/D	
Victoria	8163–69	3000	1.0	4900	2.0	20 BOPD–50 Percent water	80 BOPD–75 Percent water	
Webb	6125–48	10000	1.8	4300		Show	5.5 MMCF/D	
Montgomery	11048–70	4000	1.0	3400	3.5	Show	No help	Squeezed and Reperforated.
Austin	9571–77	1000	0.5	3500	3.0	98 BOPD–No water	98 BOPD–No water	
Austin	10140–60	4000	1.0	3800	2.0	12 BOPD–Gas lift	100 Percent Salt water	Well sanded up at end of treatment.

* 92' perforated
† 82' perforated
‡ 51' perforated



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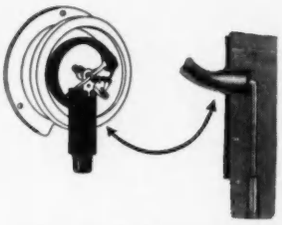

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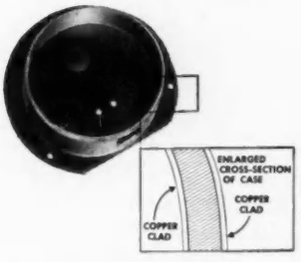
The Mastergauge always had the most effective joining of the bourdon tube to the socket . . . but . . . *one-piece construction is always better!* Welding these dissimilar parts posed a tough problem . . . but we finally solved it by a new process—the "Conoweld" process—exclusively ours. The photo of an actual section shows the perfect fusion. Socket, tube—even the end-piece—are fused into one leak-tight unit.

2—A better movement—

To convert the action of the bourdon tube into accurate pressure indication, the gauge movement must be rugged, practically frictionless, highly resistant to corrosion. A self-lubricating effect is achieved in the Mastergauge movement by using alternate stainless steel and monel—gears stainless, bushings "K" monel, and so on. A distinguishing feature is the "coined" sector gear. Note broad face of gear which results from this coined extrusion.



3—A better case—

Another development that has increased Mastergauge leadership is the new copper-clad, wrought steel case. The case has the strength of steel and the resistance to corrosion of copper. It is four times as strong as a cast iron case and one-third lighter. Final finish is a handsome corrosion resistant black enamel. Every case is fitted with Marsh safety blow-out plug—a typical advancement.

Fig. 3—This short Wilcox core, three inches in diameter, shows the interbedding of shale and sandstone.

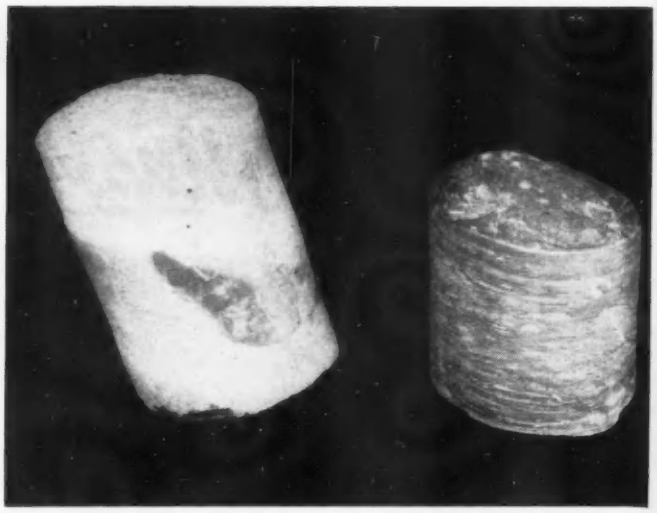


Fig. 4—These cores taken just seven feet apart. Permeable core at left, impermeable shale at right.

Fig. 5—Erratic nature of Wilcox shown here. Presence of inclusions in the impermeable sections cause zones of weakness.

Fig. 6—Vertical fracture of this core taken from the New Ulm field of Austin County, Texas, at a depth of 10,295 feet, may be natural or inflicted during coring process.

in this argument, this photograph of a New Ulm Wilcox core is presented.

All precautions in respect to the danger of getting into water or gas followed in conventional fracturing apply . . . with added emphasis . . . when fracturing the Wilcox. Among these include an evaluation of the cementing jobs, whether primary or squeeze cemented. A good cement shutoff is a prerequisite to successful fracturing.

The general hardness of the Wilcox formation is somewhat of a deterrent to fracturing techniques. This hardness, coupled with the heavy overburden due to depth, makes it difficult to create a fracture large enough to accept the sand. Because these fractures apparently were relatively small, the Ottawa sand first tried on the Wilcox would form a bridge, resulting in screenouts and failures. The fine sand now used apparently is small enough to pass into the minute fractures and form a permeable channel.

Fracturing does work. A considerable number of successful fracturing treatments in the Wilcox formation does lend support to the promise of this well stimulating idea. In its modified form, fracturing has brought about some excellent results, particularly in South Texas, as shown in Table 1. This table is a summary of 22 Wilcox fracture treatments. An examination of these figures reveal that not all were successful, and the degree of success varies from a slight increase to a huge increase. It should be pointed out that these "after" figures represent production rates several months after treatment. It must be remembered that in several cases, this form of stimulation was applied as a "last resort" measure, when the "patient well" was not a very good one to begin with. And, in some cases, fracturing should not have been attempted at all.

Fracture treatments of the last three wells listed in Table 1 did not stimulate production. The last job shown should not have been fracture because of two possible factors: (1) faulty cement seal, and (2) proximity to the water table. The other two received no aid. It is important to point out here that for any method of well stimulation to succeed, there must be sufficient oil in the reservoir to justify the treating expense.

The most outstanding increase shown in this table is that of the well

in Colorado County. This well was fractured below 9000 feet with 2000 gallons of acid gel containing 6000 pounds of sand, or three pounds per gallon. The trend in fracturing the Wilcox is toward more sand. It will be noted from a study of Table 1 that those treatments utilizing two pounds (and up) of sand per gallon of acid gel resulted in the largest percentage increase in production.

Production in the Colorado County well rose from 18 barrels of oil daily on the pump to 100 barrels daily flowing. There are some notable increases in gas production as well. To those familiar with the Wilcox, these figures are significant, although they may not be phenomenal compared to production increases in other areas.

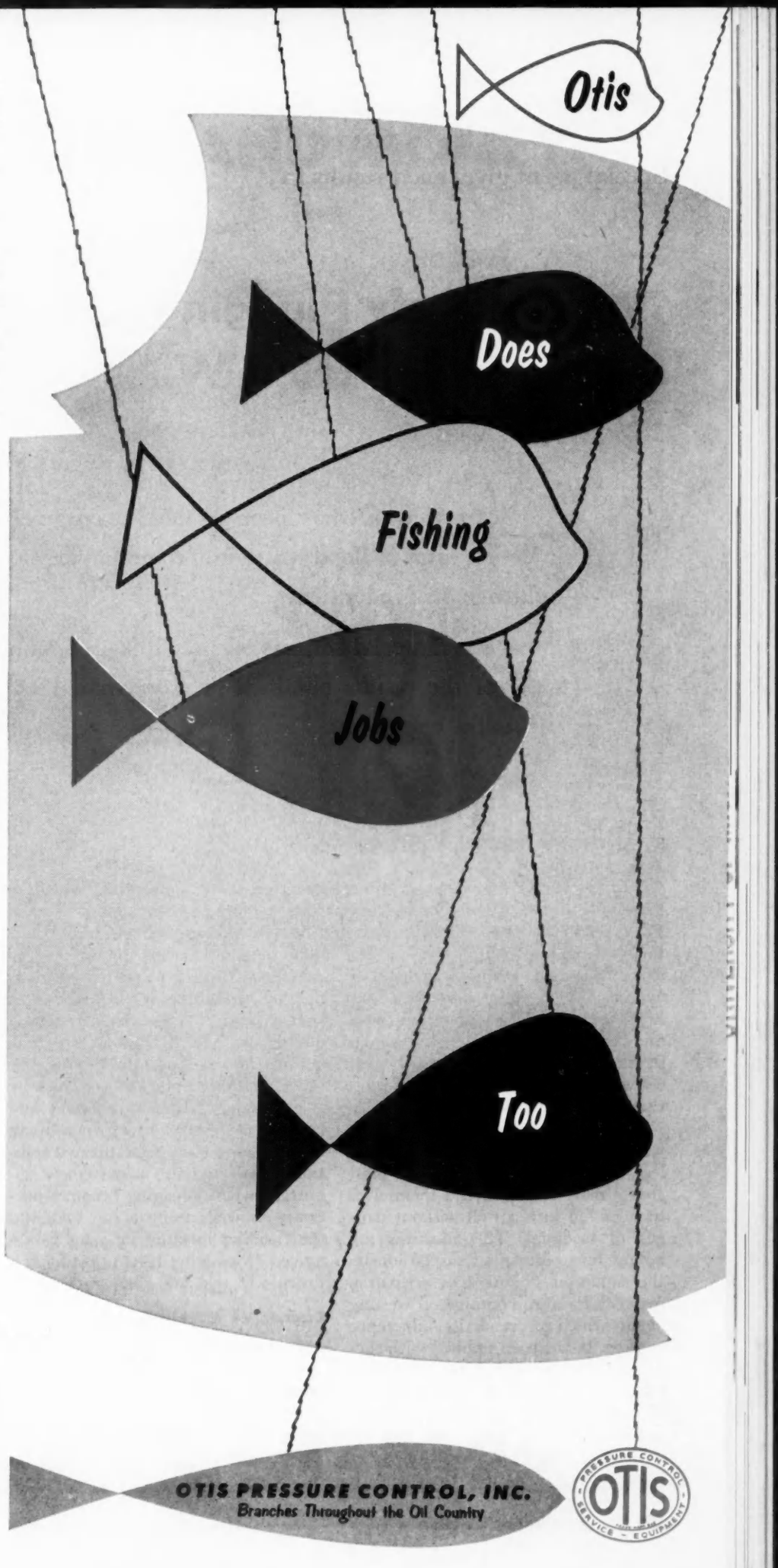
Treating procedures. Although there are three general types of carrying agents used to support the sand in Wilcox fracturing treatments, acid gel is the most popular. Reason for its popularity is the relatively high bottom-hole temperatures encountered in these fairly deep Wilcox zones.

The acid gel mixture has a more stable viscosity at relatively high bottom-hole temperatures than the gel oil. It consists of kerosine, 5 percent hydrochloric acid, inhibitors and jelling agents. It is capable of supporting the sand for one hour at a temperature of 275° F., although wells with bottom-hole temperatures as high as 350° F. have been treated successfully.

Lease oil may be used as a sand carrying agent when chemical additives are used to change the consistency of the crude. This thickened mixture will support high concentrations of sand, but due to its temperature-viscosity characteristics, it is not usually recommended for deep Wilcox wells. This carrying agent begins to thin out at about 150° F. It is hazardous to use above 180° F. because the sand will settle out rapidly in the bottom of the well causing screenouts.

Casing perforations should be clean before commencing a fracturing treatment in the Wilcox. Mud cakes increase injection pressures and cut down the injection rate. Certain acid solutions can be used to clean up the perforations prior to fracturing. From 250 to 500 gallons of this acid is

Continued on Page 205



Special agent gives good results in . . .

Selectively Plugging Water Injection Wells

- **A quick review of what has been done to cut back injection rates of flood water into zones having no influence on production.**
- **What the material consists of, how it is used, and some of the results obtained in more than 1500 successful operations.**

By ANTHONY GIBBON, WORLD OIL Staff

SUCCESSFULLY APPLIED in more than 1500 wells in Pennsylvania, New York, Ohio, Illinois, Kansas, Kentucky, Oklahoma, and Texas is a universal plugging agent that combats excessive high input rates in water injection wells. These abnormal rates are caused by wasting water through strata producing little or no oil, such as "watered out" sands, crevices, fractures, leaking packers and gas sands.

The agent is an oil base emulsion with additives ranging in size from less than one micron to the most coarse materials that lend themselves to injection into a well without danger of bridging. The additives are bound into permanent suspension by the emulsion forming a uniform matrix. It also contains a wetting agent which prevents its adherence to pipe. It has been applied with success in selective plugging of crevices and packer leaks, as well as in less critical conditions presented in highly permeable sands.

Because the specific gravity of the plugging agent is less than one, it floats on water, and when added to water does not break up or form a cloudy condition in the water, but maintains a marked definition between the water and the elastic mass floating upon it.

It is easily and efficiently introduced into a well through an inexpensive and compact lubricator and in the majority of cases a relatively small amount produces efficient and permanent results. It will not break its emulsion in a super-saturated solution of salt and this is extremely important where plugging becomes necessary in wells using a salt water as the flooding medium. It may be removed from a well by injecting hydrochloric acid and then flushing.

Causes of Excessive Input Rates

Packer Leaks—Input water often channels by the packer and the cement above the packer. In recent years it has been common practice to place a plug below the casing seat and remove the casing from the water intake well. If a packer leak develops, an inexpensive plugging operation will eliminate the necessity of a costly clean out job. It should be noted that if a 2- or 3-foot anchor is added to a hook-wall or a disc-wall type packer, the plugging job can be simplified since the annulus between the anchor pipe and the wall of the hole forms a trap for the plugging material.

Improper Packer Setting—Often packers are set and cemented too high, exposing a highly permeable unsaturated sand. This condition can result in excessive water input rates.

Pressure Parting—In many cases zones of channeling or "thief streaks" are the result of excessive injection pressures. An individual well may not always stand the pressure common to other intake wells upon the same property. This condition is called the "critical pressure" and may be determined by plotting a rising injectivity curve.

Jagged Permeability Profiles—The time to start plugging in formations that have an irregular permeability profile depends upon the recoverable oil available in these streaks. General field practice indicates that no plugging should be done until an adverse water to oil ratio is experienced. Floods in these formations are generally started with an extremely low tubing head pressure. When it is evident that all the recoverable oil has been removed from these horizons, plugging operations are in order and when completed, pressure may be raised.

Crevices—Crevices in the subsurface formations often result in excessive water input rates. Definite evidences of crevices may be determined by an excessive initial input rate at relatively low pressures and the accompanying tendency of this excessive input water to appear in a producing well several locations away from the offending input well.

Selective Shooting—Selective shooting of water input wells will minimize time, effort, and material if and when plugging becomes necessary.

Methods Used in Selective Plugging

Because of the number of different conditions that cause excessive water input rates, each well to be plugged should be treated as an individual problem. All possible data, such as

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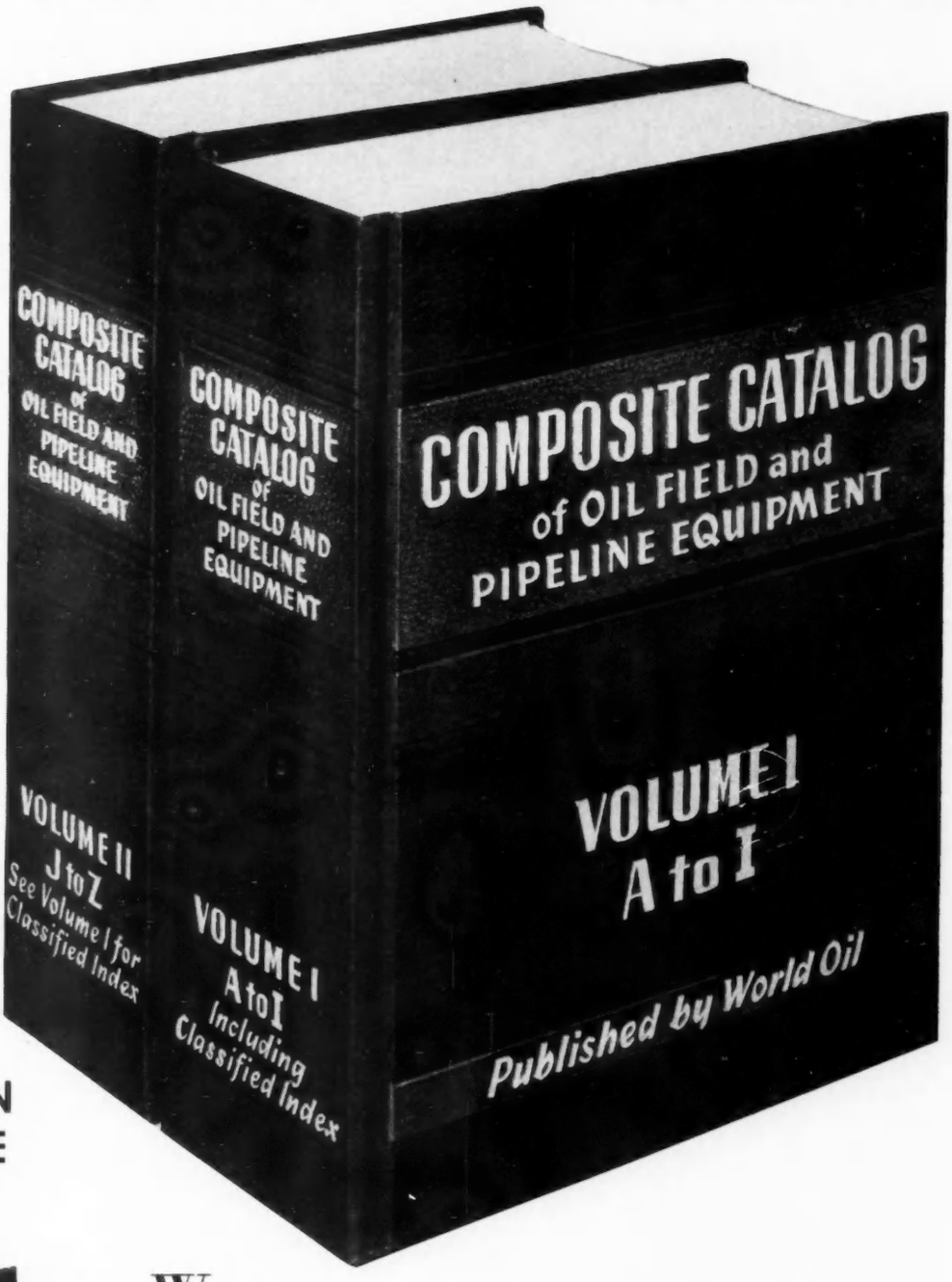
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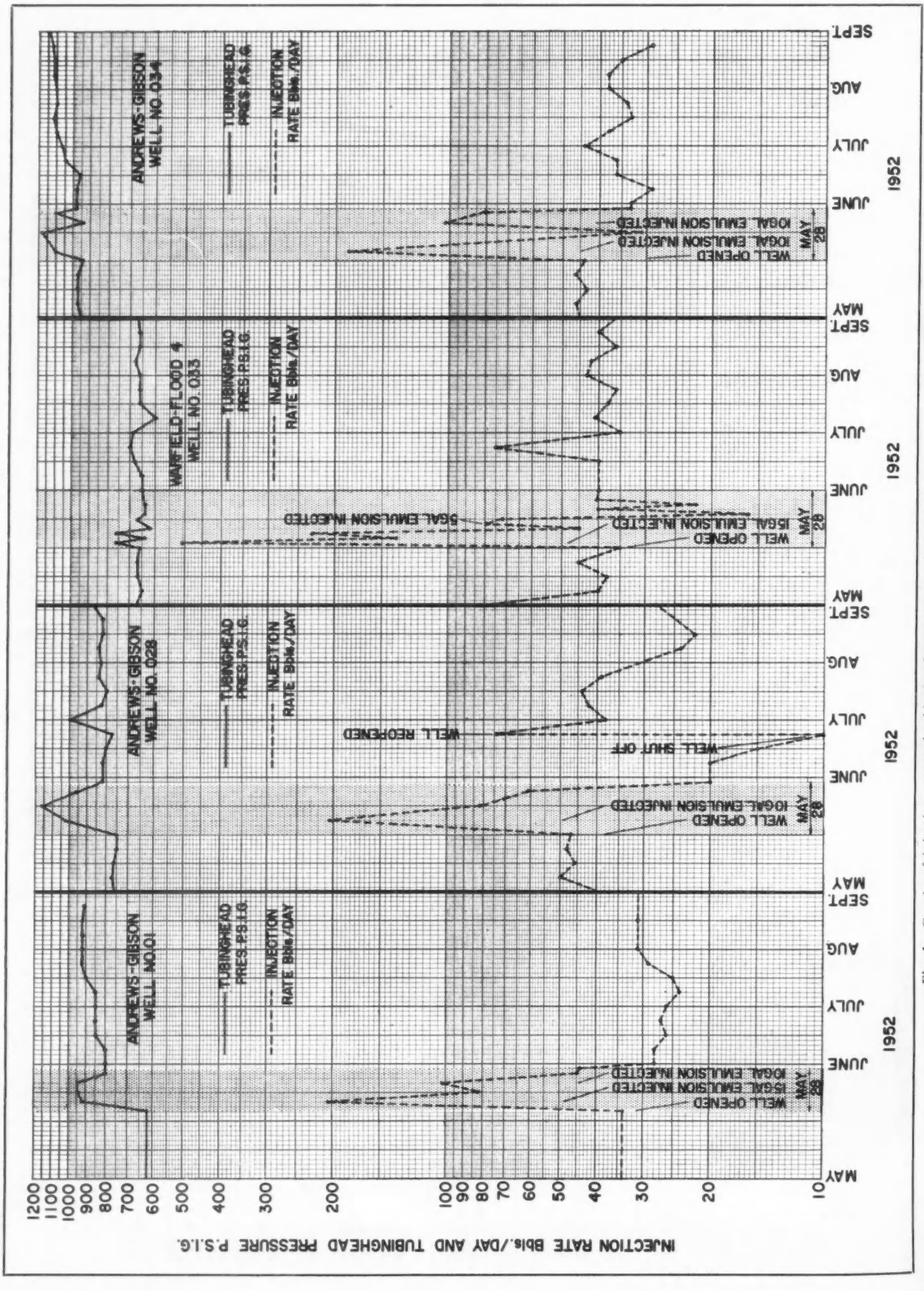

Fig. 1—Graphs of injection rate and tubinghead pressure vs. time for selective plugging information.

Fig. 1—Graphs of injection rate and tubinghead pressure vs. time for selective plugging information.

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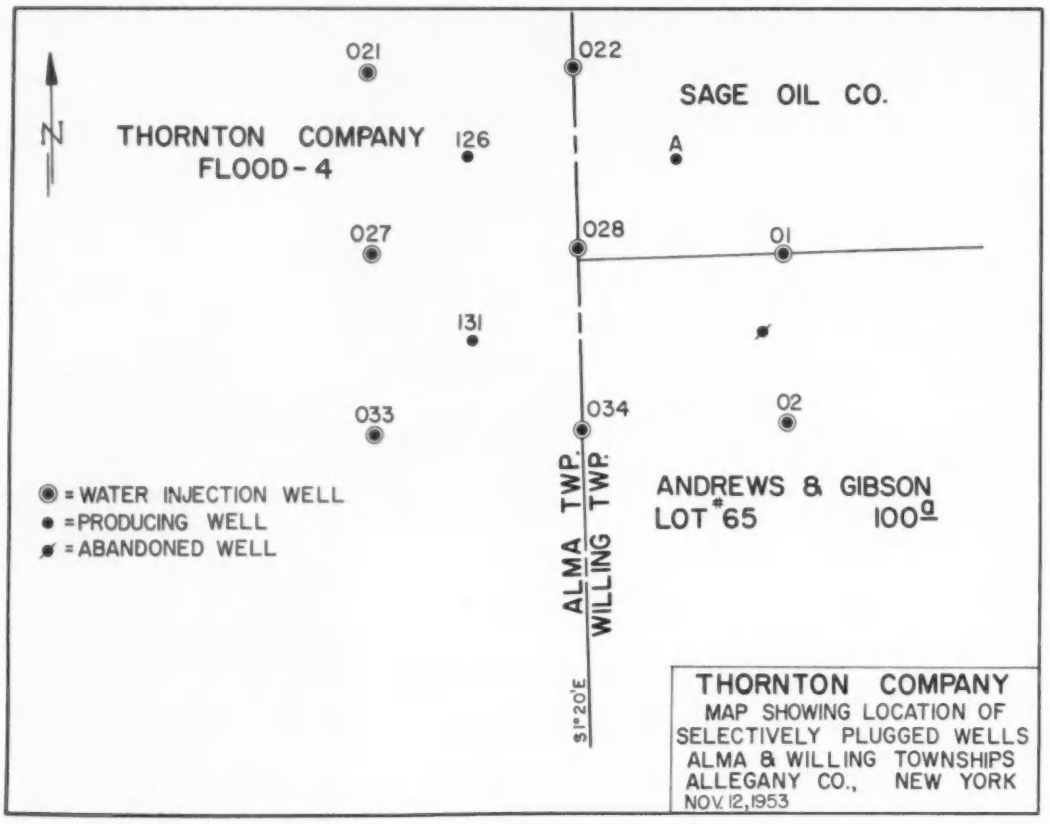


FIGURE 2

well records, core reports, logs, drilling experiences, and general field knowledge should be assembled as they will serve to guide the operator in plugging procedure. Before plugging it is essential to determine that the excess input rate is not caused by a rupture in the tubing.

Preparing Well for Plugging—To prepare a well for plugging, it should first be unplugged. This is ordinarily accomplished by reaming the tubing, injecting muriatic acid, flushing, injecting sodium hypochlorite and a final flushing. This procedure gives reasonable assurance that the less permeable areas of the sand are in condition to receive water.

Equipment—Before applying the agent in a selective plugging operation it is advisable to install a swing-gate type check valve between the well and the meter. Since the agent floats, an interruption of the water service might cause a portion of the material to rise in the tubing, enter and damage the meter, or follow the back-flow action through a lateral into a main water line. And when service is resumed, it may enter and damage a well that does not need plugging. Since the agent floats, water must enter the bottom of the lubricator and be discharged from the top. Thus, the lubricator must be in a vertical position. If the meter connected to the lubricator reads in gallons, it is much easier to determine pipe displacements since computations are simpler. Any meter can be converted to gallons by installing a new clock and changing gears in the bonnet of the meter.

Application—In applying the special agent, the plugging operator should start with a small quantity of the material, noting the effect of the initial small charge, and then proceed with an other small charge using his judgment in checking its effectiveness. The displacement of the tubing should be determined so the operator will know when the plugging material leaves the pipe and enters the sand. If the initial small charge does not reduce the input rate to the predetermined ideal rate, an additional charge may be injected. Undisturbed water service should be maintained during and after the plugging operation.

Before and after plugging, use of pressure fall-off curves (transient back pressure) are extremely helpful in determining when a well has been properly plugged.

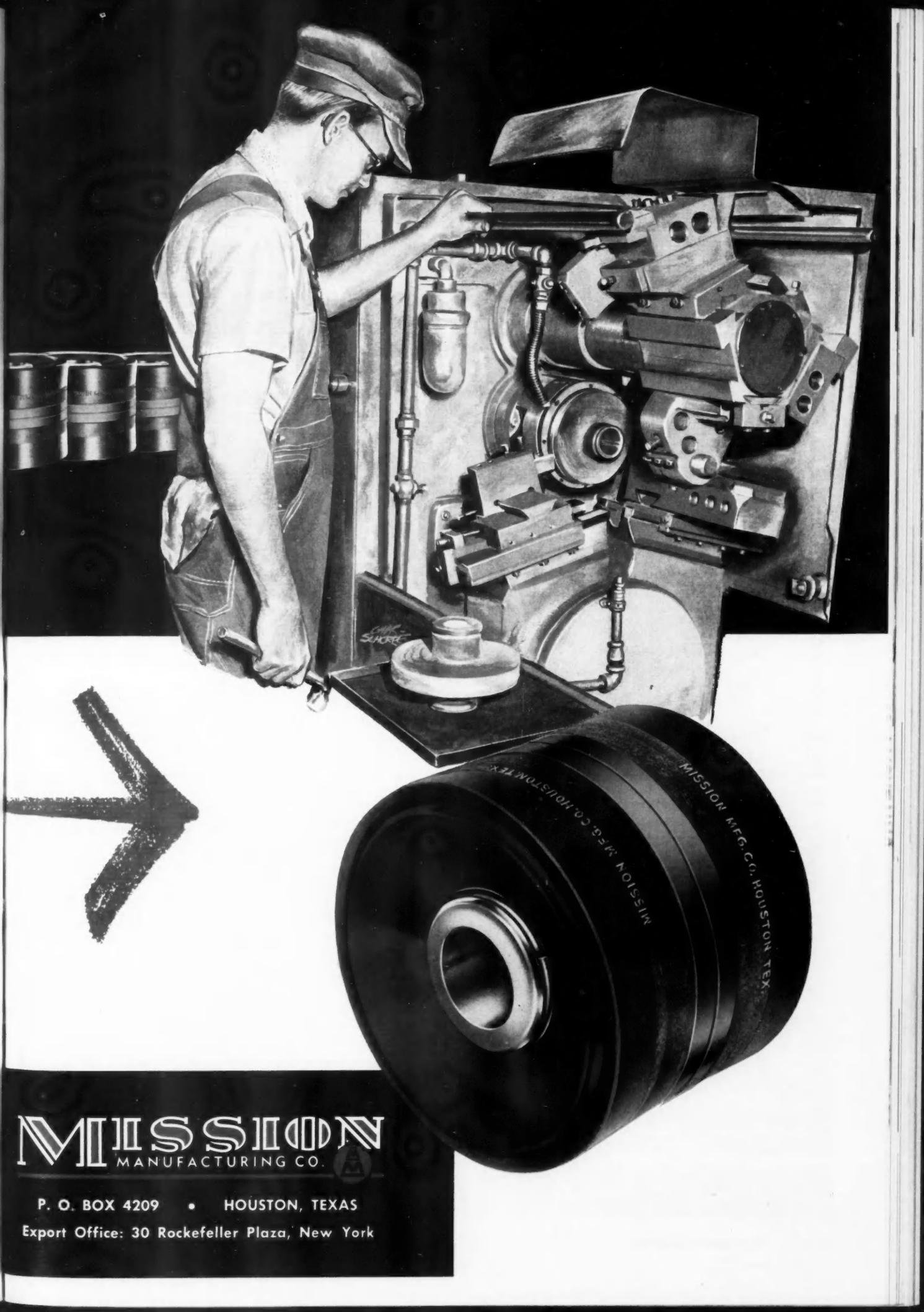
Figure 1 is a graphic presentation of the results obtained from the application of the plugging agent. The water injection wells were drilled nine months before any production wells were drilled. Upon drilling in the production wells, water broke through immediately above the sand formation in the limey strata. This limey strata, it was felt, had a very poor cementing quality. The first packers were set approximately eight feet above the top of the sand.

Figure 2 shows production well (A) where the drilling operations were stopped one foot above the sand. All water and no oil was flowing from this strata above the sand at the rate of 150 barrels per day. After plugging No. 028 and No. 01 injection wells, the flowing rate reduced at producing well (A) from 150 barrels per day to 8 barrels per day.

Figure 2 also shows that No. 033 and No. 034 injection wells were selective plugged to reduce producer No. 131 water from 75 barrels per day to 51 barrels per day. The oil was increased from 5.20 to 5.79 barrels per day.

Figure 3 is that of an average well, of 10 wells in the Berea sand, which were selectively plugged. As indicated by injection graph, the pressured water injection rate of these ten wells was reduced 1000 barrels per day and the oil production increased 4 barrels per day.

Summarizing, it may be pointed out that packer leaks, improper packer setting, pressure parting and highly permeable sands usually demand selective plugging in the early life of a flood project. The universal plugging agent discussed was developed over a period of eight years and has been applied successfully to more than 1500 input wells which represented a wide variety of causes



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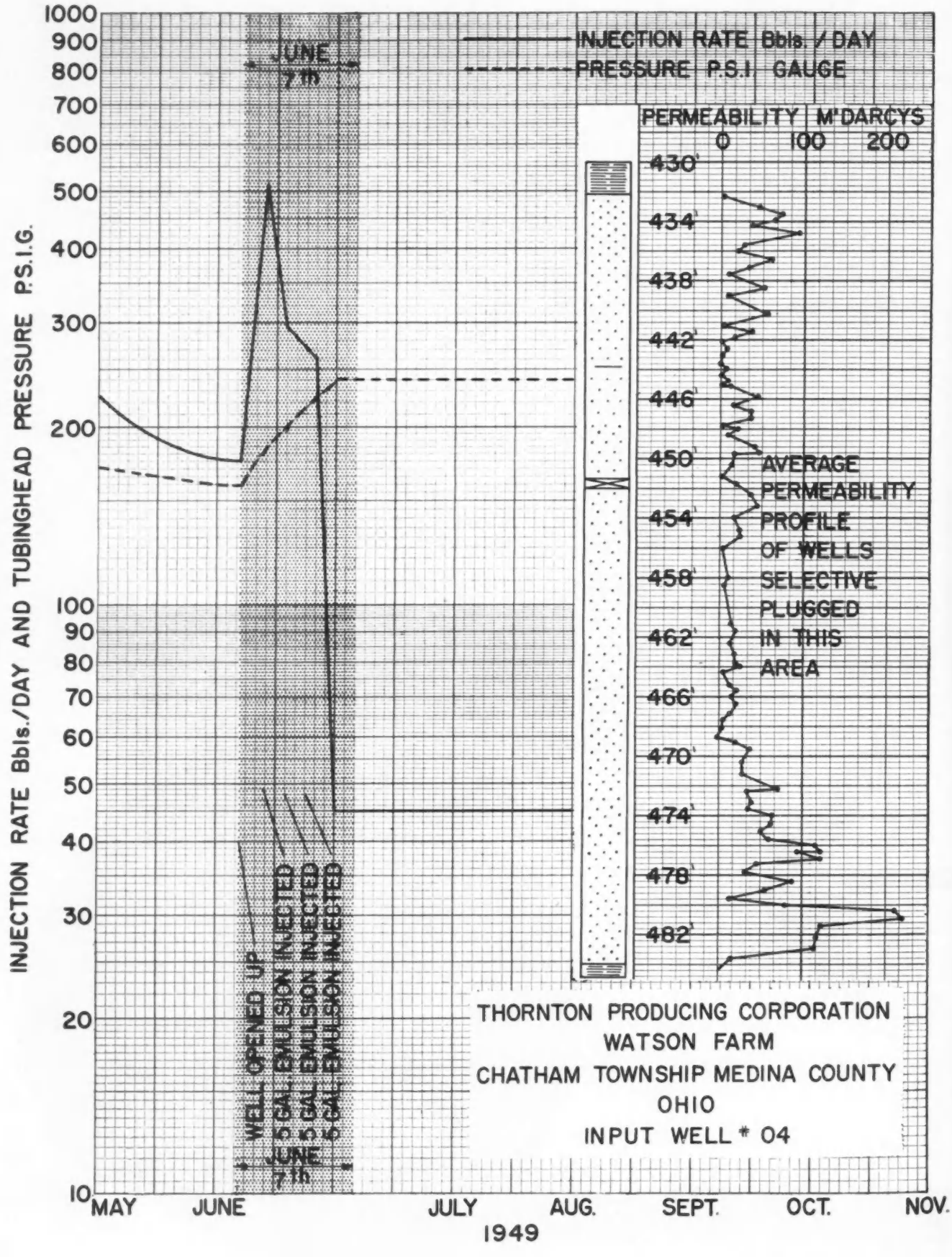

Fig. 3 — Average permeability profile of wells selectively plugged in this area.

requiring this treatment. —The End

ACKNOWLEDGMENT

The author wishes to thank R. S. Pringle, Jr., of the Selective Plugging Service, Bradford, Penn., for furnishing information contained in this article. Graphs and performance records were furnished by Knight Thornton, Henry Bohne and James C. Waterman of Thornton Company, Wellsville, N. Y.

Fracturing the Wilcox

Continued from Page 195

adequate to remove the mud cake from the perforations.

Treating procedures for fracturing the Wilcox are identical with conventional fracturing methods. Factors which must be considered prior to treating are the same. Condition of equipment in the well and surface equipment must be capable of withstanding the highest anticipated pressures exerted during the treatment. Injection pressure is first established by pumping lease oil into the formation. This is followed by the fracture treatment employing the volume and the concentration of sand desired. Last step is to flush the fracturing fluid into the formation. This is done with lease oil in volumes of about 50 barrels plus the tubing capacity.

Wilcox wells are generally shut in following treatment to allow the carrying agent to become more fluid, that is, loose its viscosity so that it will flow readily back into the well bore, leaving the sand in place. However, if the injection pressure falls off approximately one-third (Example: from 3000 pounds per square inch to 2000 psi), the well may be produced slowly immediately following the flushing operation. Reason for these precautions is to prevent any back flow of sand into the well.

Wilcox fracturing increasing. The use of a smaller grain sand and larger volume treatments has brought encouragement to fracturing this erratic and variable formation. The number of treatments are increasing, and as additional experience is gained and more is learned about the Wilcox peculiarities with respect to fracturing, undoubtedly this form of well stimulation will become increasingly important in getting out of the Wilcox more of the oil found. And, what has been learned in treating such formations in the Gulf Coast possibly can be applied elsewhere.

REFERENCE

1 "Core Analyses Aid Wilcox Completions" by Ben A. Elmdahl, WORLD OIL, June, 152, page 181.

ACKNOWLEDGMENTS

Typical Wilcox core analysis shown in Figures 1 and 2, are presented here through the courtesy of Core Laboratories, Inc., and Ben E. Elmdahl, author of Reference 1, from which article these exhibits were taken. Cores of Wilcox shown above were made available for photographing by the Department of Petroleum Engineering, The University of Houston, C. V. Kirkpatrick, director.

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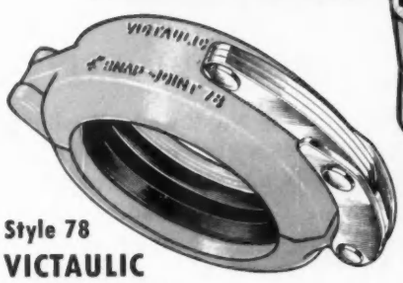

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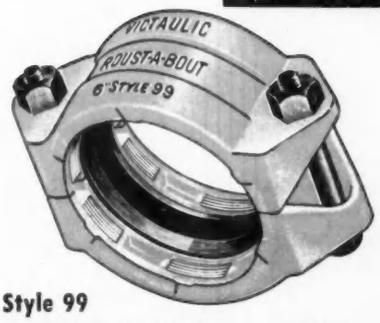

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How LPG Was Stored in A Producing Brine Well

Top of cavern used while washing out the brine from below.

SOMETHING NEW in the technique of underground storage of light hydrocarbons is being successfully practiced at Pierce Junction, Harris County, Texas, where two existing brine producing wells are being used for butane storage. This working storage operates notwithstanding the fact that the wells continue to produce brine without interruption. It is believed to be the first installation of the kind in the country and the project was engineered by G. H. Billue, president of Security Underground Storage Company, Wichita Falls, Texas.

The wells, owned by Texas Brine Company, are being used as storage by the Ellis Transport Corporation of Houston. Actually, the LPG firm is merely "renting space"—that is, space that is or would be created naturally in the production of brine, and can now be utilized. The storage space increases by about 1100 barrels each day of brine production.

Success of the project brings out these important facts about possible future simultaneous brine and LPG storage joint operations:

- Many existing brine operations can be easily converted to hydrocarbon storage, while brine operations continue, at a reasonable cost.

- Storage of hydrocarbons will assure proper protection of the roof of brine wells, thus keeping them from washing out and losing circulation.

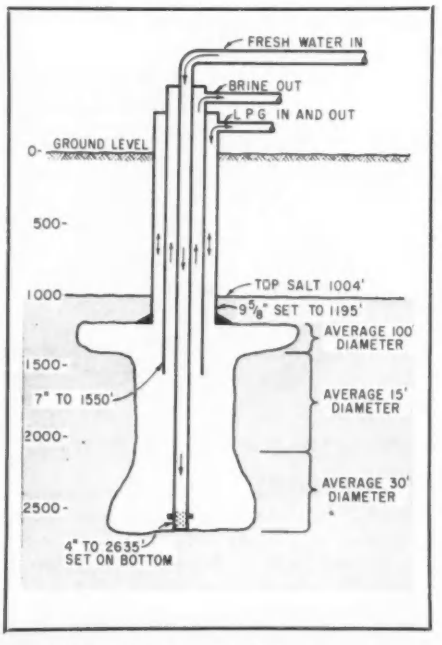
- Since brine operations are continuous, storage space constantly is being increased, thus automatically providing additional space for more LPG.

Brine from the two wells goes to Champion Fiber and Paper Company, Ethyl Corporation, and other industrial customers. A crude oil seal protection had been used to keep the roofs in both wells from washing out, but a leak developed in the 7-inch casing in the No. 2 well, allowing the seal to escape, before the LPG storage was begun.

Figure 1 is a schematic drawing of the casing program in the No. 2 well which is the deeper of the two.

The 9⅝-inch pipe which handles the LPG both in and out of the well was set and cemented as in a conventional oil well at 1193 feet, below the top of the salt logged at 1004 feet. The 7-inch pipe set to 1550 feet is hung in slips at the top of the well as is the 4-inch which is set at 2635 feet. The 4-inch string has a 4½-inch orifice approximately 15 feet from bottom, the purpose of which is to whirl the water at a pressure of approximately 50 pounds per square inch in order to wash out the salt which reaches the surface through the annulus between the 4-inch and 7-inch strings.

A sonic survey indicated a hole diameter of 110 feet from 1200 to 1300 feet; a diameter of between 10 to 20 feet at 2250 feet, and from 20 to 40 feet to 2630 feet. The cavity is enlarging from 2620 feet up to the bottom of the hydrocarbon level, probably a little faster at the bottom, decreasing as the water becomes saturated. The present shape of the cavity was caused by pumping fresh water into the top of the hole. The cavity is enlarging horizontally in the shape of a pear.



SCHEMATIC DIAGRAM of producing brine well used as LPG storage well.

The LPG moves in and out of storage in the annulus between the 7-inch and 9⅝-inch casing and serves as a very satisfactory seal for the roof of the cavity. The LPG stored in the cavity has no effect on the water pressures. To pump fresh water down and salt water out requires a pressure equal to the difference in the weight of salt and fresh water and is directly in proportion to the depth of the well. Since LPG has a different specific gravity to that of water, its pressure is proportionate to the depth of the well and this pressure is the difference in gravity between it and salt water times the feet of depth.

The water pressure does not affect the speed of washing. The washing is usually carried on from morning until about midnight, depending on the amount of brine required for the brine operation. If desired, brine can be produced for 24 hours or for any length of time required.

LPG is usually injected to storage and withdrawn during the day. However, it can be withdrawn at any time. The regular operation furnishes sufficient pressure but the rate of pumping or water flow must be increased and this can be done by opening the inlet water valve slightly, as the pumping rate is greater than that used to produce the well.

Products can be stored from 1193 to 1450 feet while fresh water is being pumped and returned in the brine operations. Storage began April 23 for No. 2 well and June 5 for No. 1 well. By Sept. 2 a total of 1,259,432 gallons of LPG were stored in No. 1 wel and 2,193,172 gallons in No. 2 well.

Effective recovery percentages ranged from 93 percent in the initial testing with butane, to a consistent recovery of 99.7 percent after commercial storage was begun.

The two wells have been in operation for six years as brine producers, and it is believed eventual storage capacity will total a million barrels as brine production increases.

—The End

How to do it

PRODUCTION HINTS

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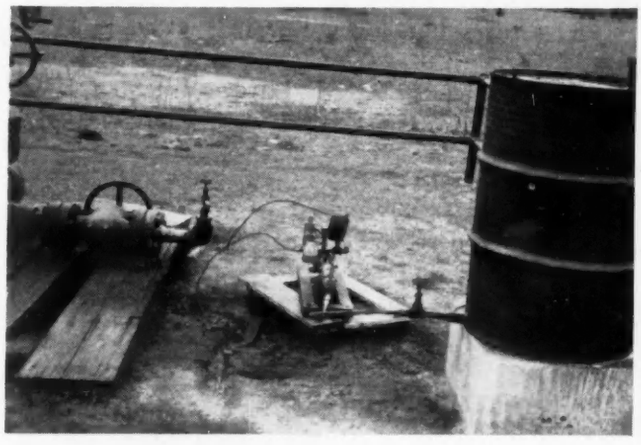
Holder Made of Casing Protects Steel Tape

A special storage holder made from old casing protects the steel measuring tape used around a workover rig and makes it handy for instant use. Welded to the handrail which is a part of the elevated floor, the tape pocket is a three-inch section of 8⅝-inch casing which has been sealed at both ends with eighth-inch steel plate. The upper one-third of the casing was cut off so the steel tape could be inserted into the holder. Holes in the bottom of this storage device drain water which might collect there.

Since steel measuring tapes under ordinary conditions are difficult to keep undamaged and in a readily available place, this holder is a welcome addition to the workover derrick floor. The tape is protected and always can be located when needed.

Device Injects Inhibitor Into Casing



On high-pressure condensate wells where inhibitor must be injected into the casing, a simple hookup may be made for the chemical pump by using a drum of chemical and a few feet of copper tubing.

The chemical pump is set near the wellhead and the discharge line hooked up to the casinghead. The power line is connected to the gas flow line from the christmas tree. The intake line to the pump is connected to the bottom of the drum so that the entire drum can be pumped into the well.

After the hookup is made, it is simple for the pumper to adjust the flow of chemical to conform to the rate of flow of the well. At first the pump is set at a fast rate so that the casing and tubing will build up a coat of inhibitor. Then the rate is lowered until it more nearly conforms to the rate of gas flow so that it will keep the corrosive elements in the gas unbalanced to provide ample protection.

Field Office Porch Has Removable Rail

The back porch of this field office serves as a loading and unloading platform for office furniture and fixtures, and is equipped with a removable handrail. A heavy bump stop is fabricated from four-inch pipe welded as shown and set in large concrete footings. It serves to prevent trucks from damaging the porch and possibly the office building which rests on blocks.

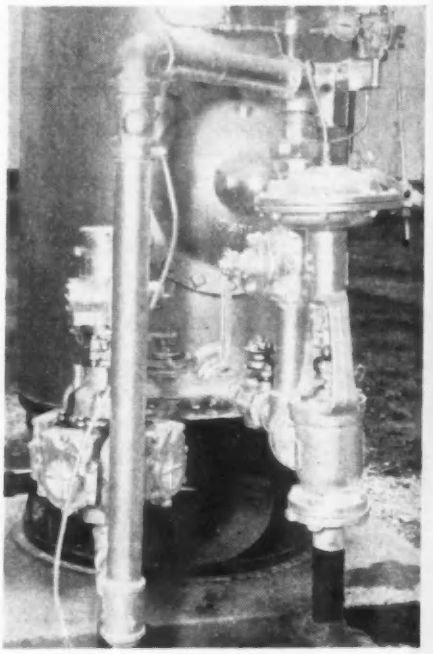
The two stair step approaches to either side of the porch are made from sucker rod material. Each step unit is separate, and is joined to the other by an interlocking handrail also made from sucker rod material. This center handrail section consists of two horizontal pieces spanning the porch, with the tips of each section bent downward to fit into short nipples of one-inch pipe. These short nipples are welded to the upright support of the handrail on each end stairway section.

The entire stairway and handrail can be removed easily by one man, yet is sturdy enough for its purpose. It is simple enough to remove the center section of the handrail to loading and unloading trucks backed up to this porch.

Meter on Test Separator Permits Accurate Gauging

The test separator on one Gulf Coast lease is equipped with a positive displacement volume meter for accurately gauging the production of each well on the lease. Not only is a test tank eliminated, but accurate gauges of production are obtained. In some cases, a special stock tank is used only for testing well potentials. Such tests are used in the adjustment of daily per well allowables.

The positive displacement meter connects to a tee in the dump line of the test separator as shown. Flow is through a plug valve, then into the meter, out of the meter, back into the dump line, then through the dump valve and into the stock tanks. A bypass dump line connects directly from the dump valve through a blocking plug valve into the separator. If meter repairs or replacements are necessary, this bypass line may be opened and the meter taken out of service. The meter is on the upstream side of the separator dump valve to eliminate



gas that might be trapped into the oil and cause a faulty volume reading. Since the separator is under about 30 pounds pressure, there is little chance for gas to form in the line leading to and from the meter. Pressure is dropped only after fluids pass through the dump valve. This pressure is adequate to flow fluids into stock tanks.

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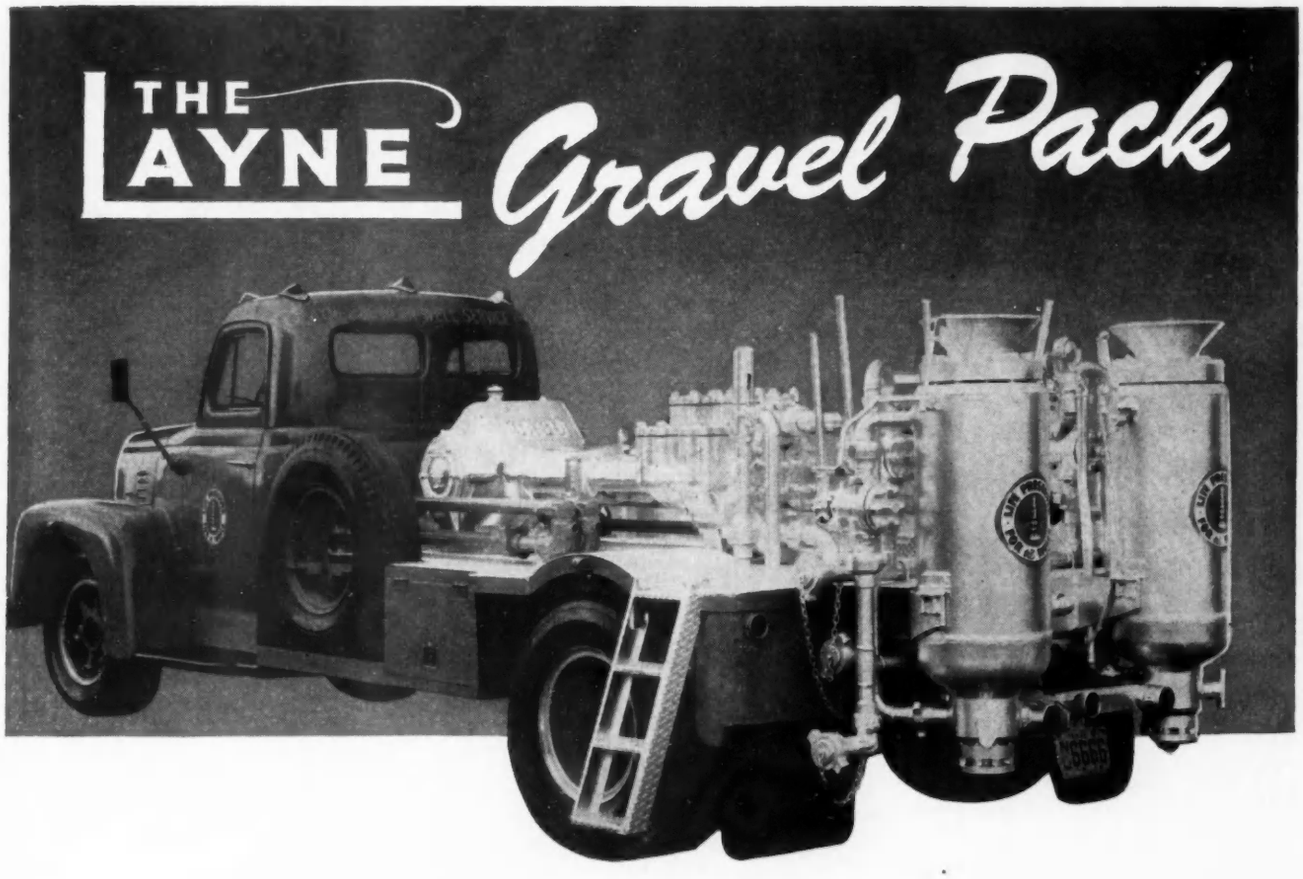
Unitized Drip Device Is Made of Scrap Material

A unitized drip to catch all entrained liquids has been developed by a Gulf Coast company. It consists of swelling out the main line to slow down the flow of gas, then hanging a pot of a line of smaller size on the bottom of the line with a large connection so that all the liquids will be caught as they go by. This device is placed in the lowest part of the line and is attached by means of the drip line and a plate welded to the other end for bracing. One outlet is provided so that the condensate may be



The ONLY Method of Gravel Packing With Circulation

Gravel Packing is a subterranean engineering problem and has been a Layne specialty for years. Each well requires individual treatment. Successfully applied to thousands of wells at all depths, Gravel Packing has proven conclusively it will control sand, when other methods have failed.

The Layne patented method of gravel packing is with circulation. The gravel and well are under control at all times. This method was developed and perfected after years of actual field experience and extensive research.

Layne Gravelling Equipment consists of specially designed high pressure mixing drums, pump, manifolds, control valves, etc., assembled into a unit and mounted on a truck. For off-shore jobs the unit is mounted on skids. The gravel is measured when placed in the drums and mixed with fluid, then deposited in the well under pressure.

for complete information write

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REDA PUMPS

FIRST CHOICE for Secondary Recovery Water Flooding...

The lower the expense of producing source water from wells for water flooding operations, the greater the ultimate profit.

Reda Pumps for source water wells provide many ways for lowering these production costs.

Improved design and longer operating life *lower* the cost of labor per barrel, *lower* the cost of maintenance per barrel, *lower* the investment cost per barrel, *lower* the cost of fluid per barrel.

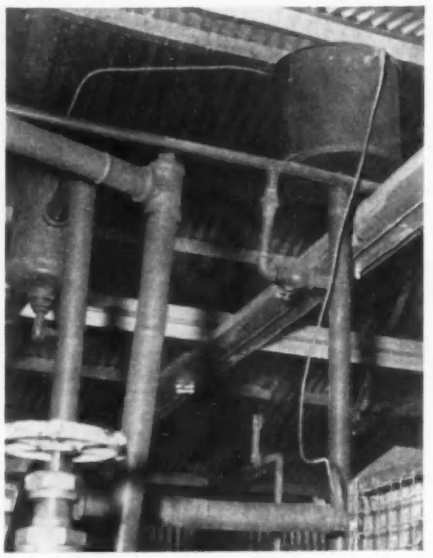
Also the ability of Reda pumps to produce greater volumes in limited casing sizes and from greater depths often reduces the number of source water wells required.

Reda engineers have long been associated with water flooding operations and are fully qualified to assist operators in discussing their source water requirements.

REDA
PUMP COMPANY
BARTLESVILLE, OKLA.

blown to a drip tank and saved.

By making the main line larger at the point of the drip, it provides space for the liquids to fall out and be caught in the container hung on the bottom of the line. By making the drip a part of the line, swing-joints are eliminated and the drip itself moves with the line under expansion and contraction. The blow-off line, being of small diameter and swung at right angles to the main line, will not be in danger of breaking out during movement of the line under expansion and contraction. This entire unit may be buried on the main lines and the connections to the main line are strong enough that the drip will make its own space in the ground and allow for expansion and contraction.



Radiator Fill System Eliminates Daily Care

Here is a unique method of maintaining a full radiator over long periods of time without day-to-day care.

The radiator in this case cools water which is circulated through the jacket surrounding the cylinder head of a single-stage gas compressor. This system is so effective that it maintains the water temperature at about 180° F. while compressing 80-pound gas to 250 pounds. The cooling water is circulated by a centrifugal pump, belt-driven off the compressor engine.

Hot water returning from the compressor jackets passes through a scrubber in which scale and other solids

FOR SALE

BY SEALED BIDS

4 LST's

FOR SALE: By Humble Oil & Refining Company, four unconverted LST's (Landing Ship Tank). Original Government Numbers: 309, 844, 930, 942. Stored at Orange, Texas. Sealed bids will be accepted up to 4 PM September 16, 1954, and bids will be opened at 9 AM, September 17, 1954. No options will be granted. **Humble will not pay nor be responsible for payment of any commissions in connection with sale of these ships.** Sale is "as-is, where-is." Terms: cash within 30 days from acceptance of bid. **Humble Oil & Refining Company reserves the right to reject any and all bids.** Information regarding bid procedure and inspection schedule available from Mr. Westbrook Teer, telephone Blackstone 4411, extension 326, or P. O. Box 2180, Houston, Texas.

More Horsepower

SAND-BANUM
REMOVES AND PREVENTS BOILER SCALE AND CORROSION

and Less Fuel
Enjoy Efficient Economy

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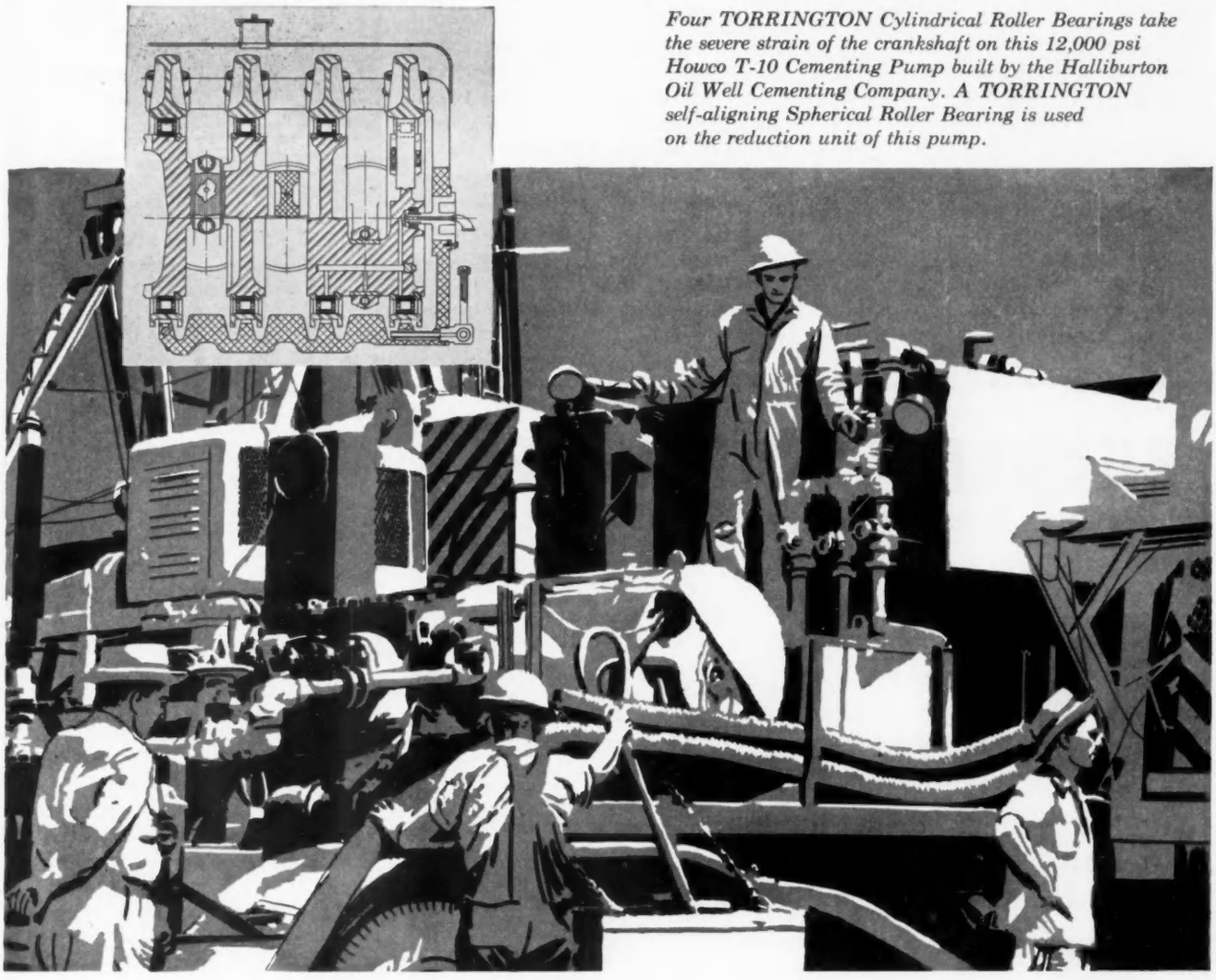
TORRINGTON BEARINGS AT WORK



Four TORRINGTON Cylindrical Roller Bearings take the severe strain of the crankshaft on this 12,000 psi Howco T-10 Cementing Pump built by the Halliburton Oil Well Cementing Company. A TORRINGTON self-aligning Spherical Roller Bearing is used on the reduction unit of this pump.

Cementing fast and efficiently for less!

TORRINGTON Cylindrical Roller Bearings are used in many oil well cementing pumps because they are designed to cut friction under high radial loads and because they meet severe weight and space requirements.

Precision tolerances and finishes on both rollers and races assure low eccentricity and uniform load distribution. Friction is cut to a minimum.

One-piece, cast bronze cages, with machined pads in each roller pocket to guide the rollers accurately... minimize wear, lengthen bearing life. Individual roller retainment keeps rollers well lubricated and simplifies the inspection of race surfaces.

Use TORRINGTON in your cementing pumps and heavy duty oil-drilling equipment. Join the growing numbers of builders and users who know from experience it pays!

THE TORRINGTON COMPANY

South Bend 21, Ind. Torrington, Conn.

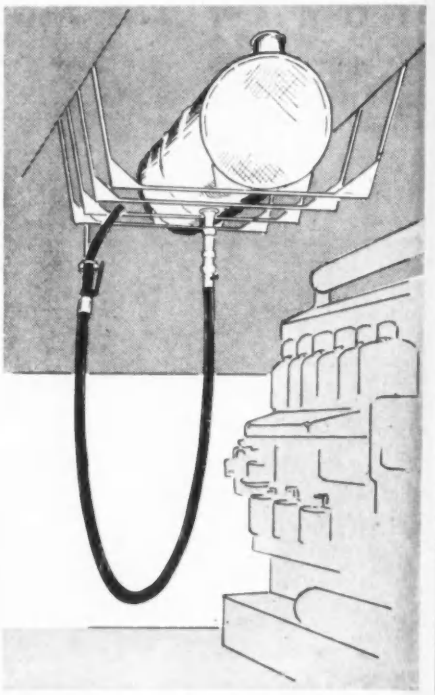
District offices and distributors in principal cities of United States and Canada

TORRINGTON BEARINGS

Spherical Roller • Tapered Roller • Cylindrical Roller • Needle • Ball • Needle Rollers

may settle out before entering the radiator. This scrubber is shown at upper left behind a two-inch line. Discharge from this scrubber ties into the top of the radiator. Cooled water is then taken from the bottom of the radiator by the centrifugal pump.

The radiator fill system consists of an eight-foot section of two-inch pipe connected to the radiator discharge at the bottom, and equipped with a bucket arrangement at the top. This container, about 14 inches high and 18 inches in diameter, contains an exposed gauge glass so that the water level in this bucket can be maintained by a water supply line connected to the vertical two-inch fill line. The bucket has an overflow tube which carries off excess water allowed into the container. The elevation of the fill bucket above the radiator and compressor imposes a very slight pressure, but insures sufficient fill water for a considerable length of time. The pumper need only check the buckets occasionally and fill them to predetermined levels.



Tank Over Engine Provides Lubricating Oil Storage

Large engines tied into heavy duty waterflood pumps require relatively large quantities of lubricating oil when it is necessary to change the oil. A convenient tank for lubricating oil at one remote water injection pump station provides storage sufficient for several oil changes in the driving engine.

Two 55-gallon drums are welded end-to-end to form a long cylindrical vessel with a capacity of 110 gallons of lubricating oil. This storage vessel is mounted on a rack supported by the steel beams of the station housing. The rack is well above both the pump and engine and about midway between them. The rack is constructed of sucker rod material welded in the form shown. Where the rods connect to the steel overhead beams, a flange plate is welded to the rod to form a web that is welded to the beams.

At the bottom of one drum is a 1½-inch connection with a short extension of steel piping containing a control valve. The filling cap on top of the drum is visible at the near end. A neoprene rubber hose is attached to the discharge piping and a regular gasoline pump hand-controlled nozzle enables the pumper to control easily the flow of oil into the engine crankcase. Draining and refilling the crankcase may be done quickly and with little trouble, thereby providing an incentive to make the change when due.

RUBBER GUIDE CAGES

Patent No. 2,591,174

OPEN TYPE TOP CAGE

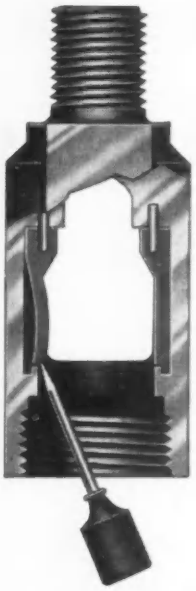
1. Resilient Synthetic Ball Guides do not beat out—

2. Outwear Metals—

3. Protect the Ball in Several Ways—

4. Reduce Ball and Seat Failures—

5. Reduce Pulling Jobs—



Guides are Easily Replaceable

DOUBLED BALL and **SEAT LIFE,** on the average, is reported by most users of Martin Cages. This can readily mean a considerable saving in lifting cost and lost production. Add the saving due to longer cage life and you have a two-fold benefit which can amount to many times the cost. It is quite likely that some of the cages you are now using are more expensive and do not give you the above advantages.

Available in all sizes and styles, Open or Closed Types, 1″ to 4¾″.

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POLICYHOLDERS
Say

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Ask the Texas Employers representative nearest you to show you more of these letters, as proof of what Texas' largest writer of Workmen's Compensation Insurance can do for you.

40TH ANNIVERSARY 1914-1954

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"We wish to acknowledge with thanks the dividend check you recently delivered to us. Our cash dividend amounted to $1,891.62 and with the Guaranteed Discount of $459.88 made our total savings $2,351.50 on Workmen's Compensation premium paid.

"We now realize more than ever the value of a real safety program. Not only have we brought our experience rate down from a 5.3% debit to a 17.7% credit, but on top of this we have received back from you 33.2% of the premium actually paid.

"We want to thank both your Safety Engineering and Claims Departments for working so closely with us in accident prevention and claim handling."

Largest Writer of WORKMEN'S COMPENSATION INSURANCE *in Texas*

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As pioneers in the treatment of flood water in the Mid-Continent Area since 1938, our trained staff of water engineers, chemists and bacteriologists are familiar with your every day flood water problems.

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Consultants to the leading major companies and independent operators with Secondary Recovery Operations.

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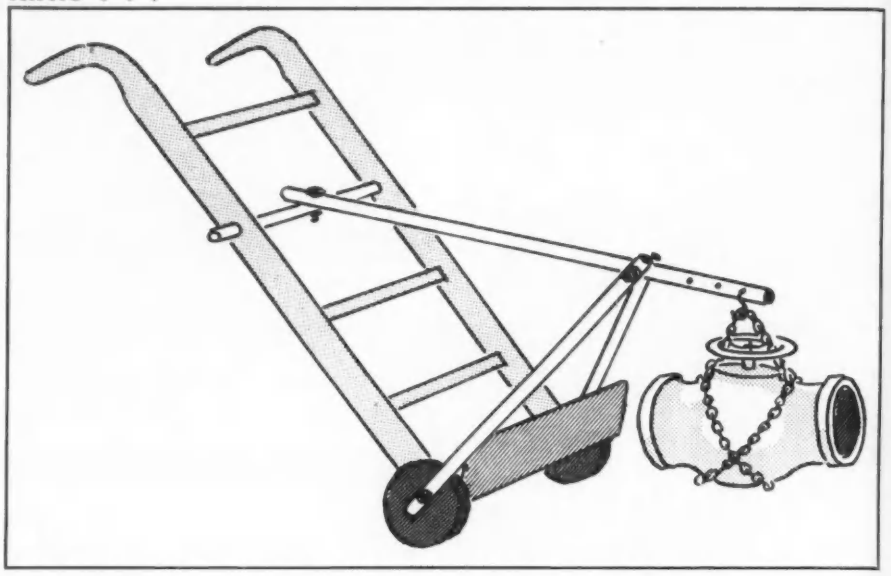
HINTS . . .



Hand Truck Aids in Handling Equipment

A warehouse hand truck equipped with 1¼-inch pipe braces can be used to handle heavy valves and equipment around the warehouse.

The pipe braces shown here are 1-inch and 1¼-inch pipe that can be easily bolted onto any ordinary warehouse truck. The cost of the entire assembly is about $18. It is demountable, permitting dual use of the truck. To make it, replace one of the rungs with steel pipe. Bore or drill a bolt hole through it to attach the long member, as shown.

A short length of chain for wrapping around some items makes a convenient accessory for this tool.

CUT A ROAD to Your Wells

It's no trick to cut a road right through the brush with a Caldwell S-2 Rotary Brush Cutter. The machine's 57-inch Spring Steel blade, equipped with Caldwell's exclusive Dagger attachments, will cut brush two inches thick and better, and do it so cleanly that cars and trucks can go right in. And you can't beat an S-2 for site maintenance. Write for the whole story.

E. L. CALDWELL & SONS
Corpus Christi, Texas

Cut it all With a **CALDWELL**

(Pat. Pend.)

Air-powered
TUBING SPIDER
(A Cavins Co. Product)

Two more reasons for owning an **ADVANCE TUBING SPIDER**

1 **SAFETY:** The Spider is equipped with a manually operated safety latch which may be used to positively lock the slips in their closed position.

2 **ALLOWS STRIPPING:** Slip design and low working pressure allow operator to strip tubing and collars up through the slips while they are in closed position. Also, the slips cannot be accidentally thrown away from the tubing if the tubing should part or slide.

Bulletin TS-54 tells the whole story.
We invite you to send for your copy.

Advance Oil Tool Co.
2853 Cherry Ave., Long Beach 6, Calif., Ph. 485-64
Mid-Continent Rep: Hillman-Kelley
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ON MARACAIBO

A barge . . . a boom . . . can of dynamite kill a well fire

NOTHING WAS left to chance.

Paul (Red) Adair, world-widely known right hand man of master firefighter M. M. Kinley, Houston, Texas, hopped to Venezuela fresh from a well fire in New Mexico, skipped to the site of a Mene Grande Oil Company fire on Lake Maracaibo, and jumped onto the job in short order.

Lagunazo 5 had broken out into a fiery blaze March 12 when a spark resulted from a stone striking metal as it hurled upward impelled by a sudden gas surge. Operations were immediately begun to tap Lagunazo 5 from Lagunazo 4 to relieve subsurface pressure below the blazing well. Great quantities of water were pumped into the subsurface from Lagunazo 6 in an effort to keep the heavy oil from the underground gas cap.

Upon arrival, Adair carefully surveyed the site. On the fifth day after the fire began, a large boom was built on Mene Grande barges. Pumps and fire hoses were fitted and tried out. On the lake and at a safe distance, a small shacked barge was anchored. It sheltered explosives.

At 10 a.m. on the fifth day, the barge holding the boom and extension moved toward the fire. Hoses played thick streams of water on the boom end and the 50-gallon drum intended to hold explosives should blasting prove necessary. As the barge moved forward, the boom was held over the flaming derrick wreckage while water was poured on. Several times the fire appeared under control, but the water was never able to break the stream of roaring gas.

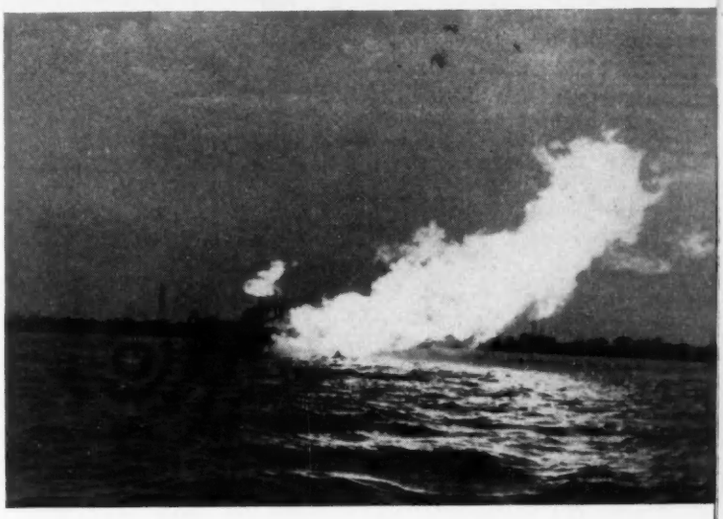
At 11 a.m. the barge backed away.

Next day, the barge closed in on the burning well. The fire hoses shot streams of water at the boom and the drum holding about 500 pounds of asbestos-lined explosives.

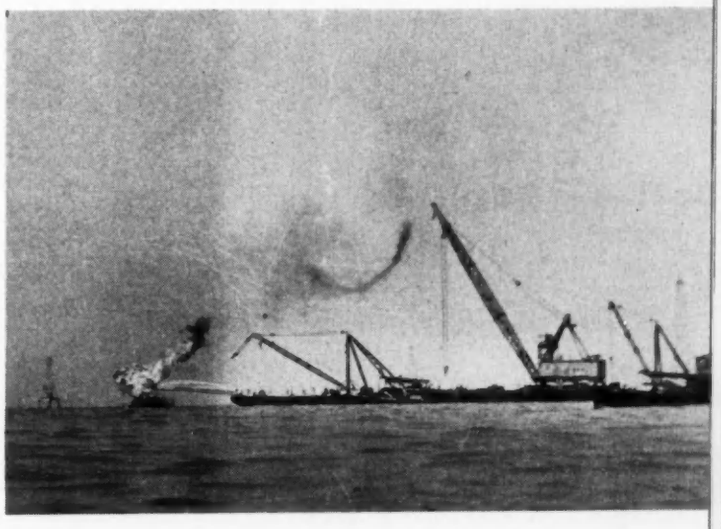
Seconds after the boom extension and drum hovered over the wreckage, a puff of smoke appeared and a split second later there was a muffled explosion. As the smoke cleared, water played over the still hot wreckage. The drum and boom extension were no longer attached to the boom.

The fire was out—an unspectacular finale of a spectacular event. —**The End**

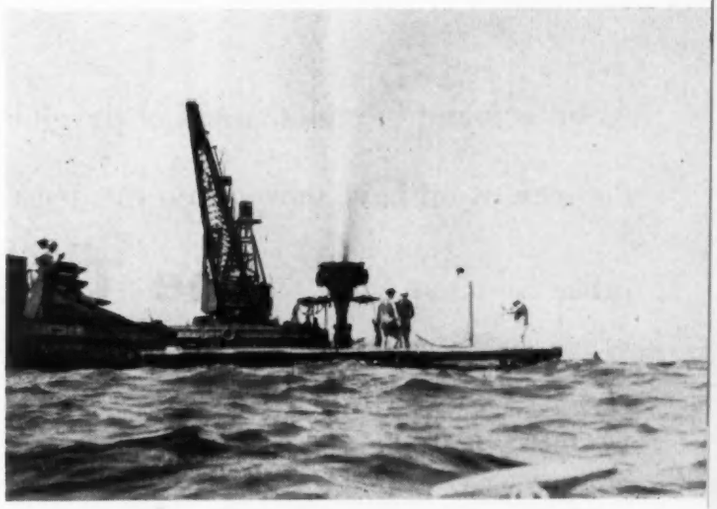
PHOTOS BY R. L. LEE



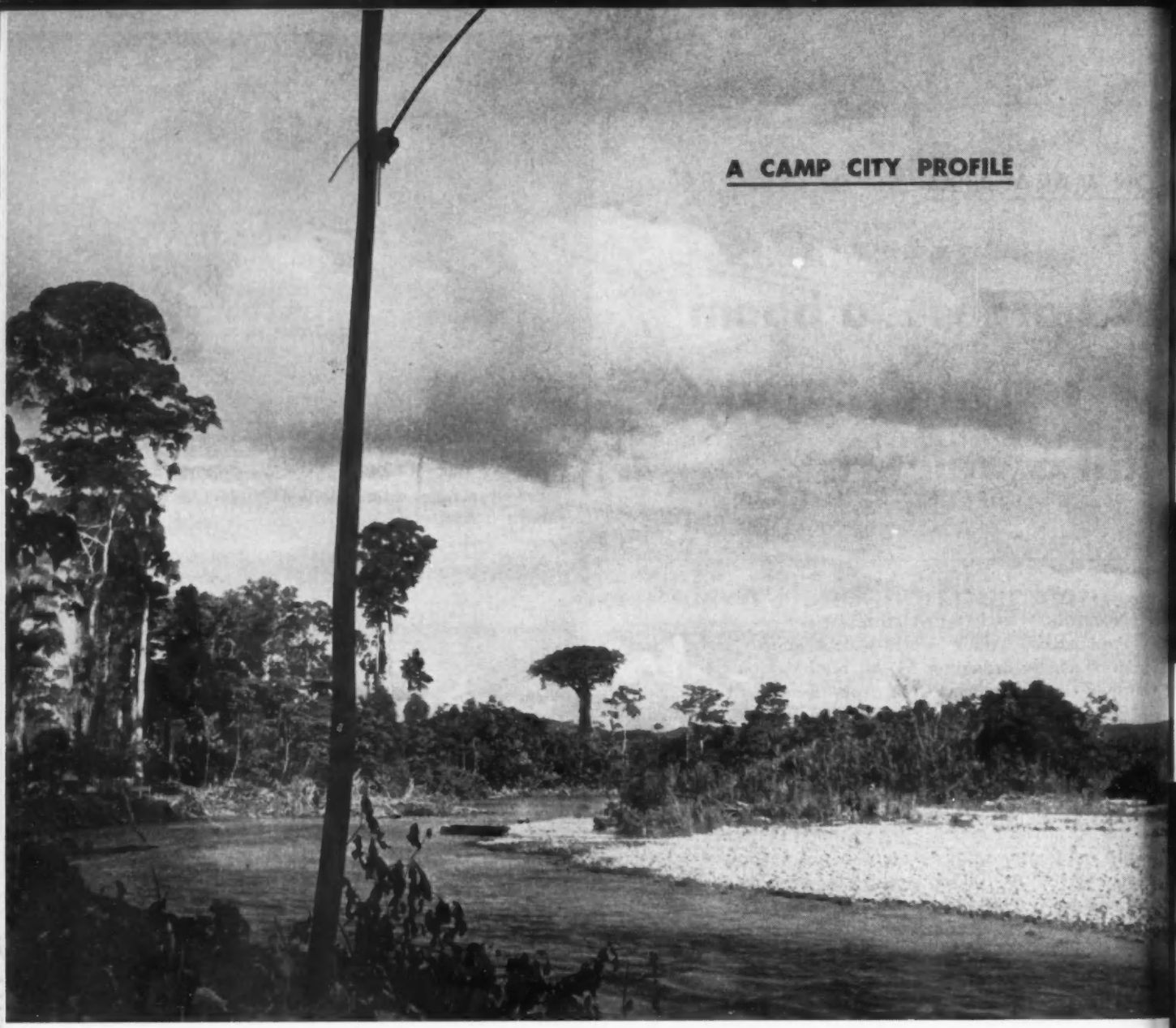
1 At night the sky was lighted up and the glow was visible for miles from Mene Grande Oil Company's Lagunazo 5 fire.



2 The barge inches forward and the boom is lowered over flaming derrick, while water is poured on. At end of boom, the 50-gallon drum of explosives held the answer.



3 Eight days after the fire was extinguished, water jetted forth with the still-escaping gas. Although soaking wet, workmen continued constructing platform to facilitate further controlling operations.



THE RIO SARDINATA NEAR TIBÚ, COLOMBIA

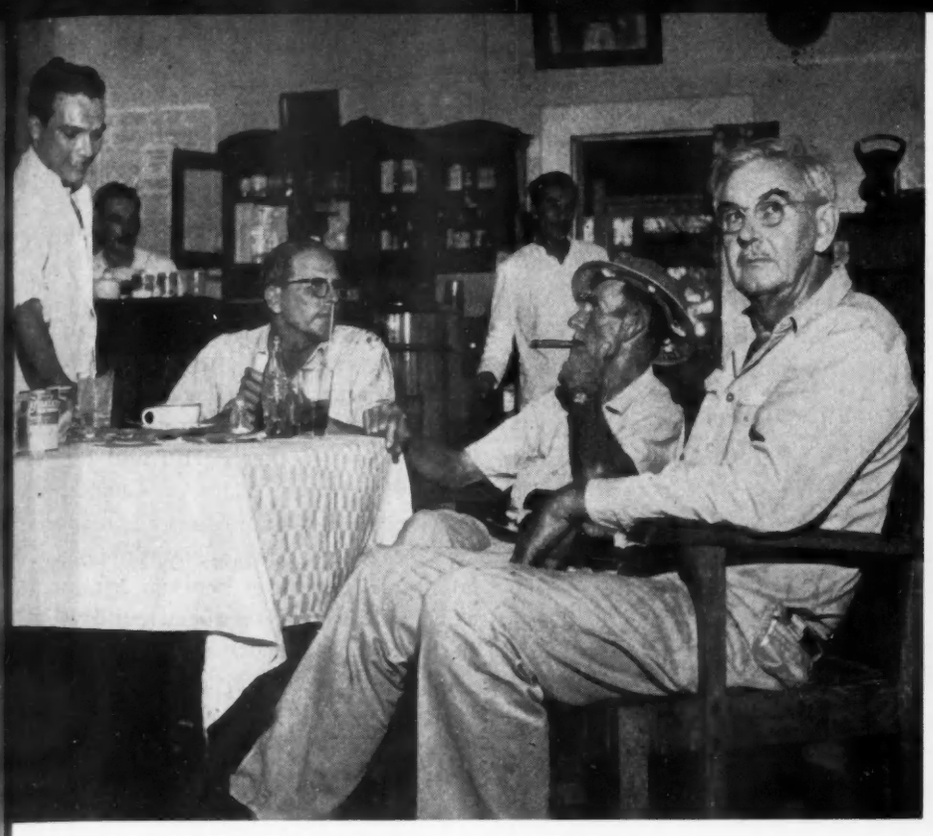
As oil is found in remote areas of the globe, new avenues are opened to civilization. Now the men of oil have moved into the dense tropical jungles of Colombia and added another conquest with . . .

The Taming of Tibú

By JAMES JOSEPH

TAKE A DENSE, tropical jungle area, let man discover oil there and then a new outpost of civilization springs up. That in brief is the story of Tibú, the main camp of Colombian Petroleum Company's Barco Concession in Norte de Santander Department in northeastern Colombia.

Oil was discovered at Tibú in 1940 about the time production from Colpet's older Petrólea field, a few miles to the south, began to decline. The camp at Tibú was established in 1944, and the original Petrólea camp has been gradually abandoned. In the al-



CONVERSATION. Taking time out in the Staff Club are, seated left to right, John Williams, drilling foreman; Scotty Jones, construction engineer, and W. G. Bowen, chief petroleum engineer.

CARDS. Here a group turns to cards in off-duty hours. Left to right are Dr. Marcucci, G. Rojas, M. Ivanovich, Dr. Molina, and Dr. Borda. The physicians are members of the camp hospital staff.

BEHIND THE EIGHT BALL. Colombian Petroleum Company's Whitey Martin relaxes in club's game room.

This feature, one of a series describing important oil camps or cities throughout the world, is intended only to describe living conditions and to give a bit of the local atmosphere. While an occasional one of the features may touch lightly on working conditions, it will do so only incidentally.

TIBÚ STAFF CLUB provides employes relaxation and fun.

most 15-year interval, Tibú has grown from a wildcat operation to an oil field of more than 200 wells producing about 24,000 barrels per day and with a recently completed 2200-barrel daily refinery integrated with a gasoline absorption plant of 61 million cubic feet capacity.

These oil facilities have become the vortex for civilizing a region which is but a decade or so removed from the terror of unfriendly Indians. As Tibú grew, pioneering Colombians came to build thatched huts along company roads and near the camp. And, though Tibú remains essentially a camp for men only, a handful of Americans and their families have homesteaded just outside the compound.

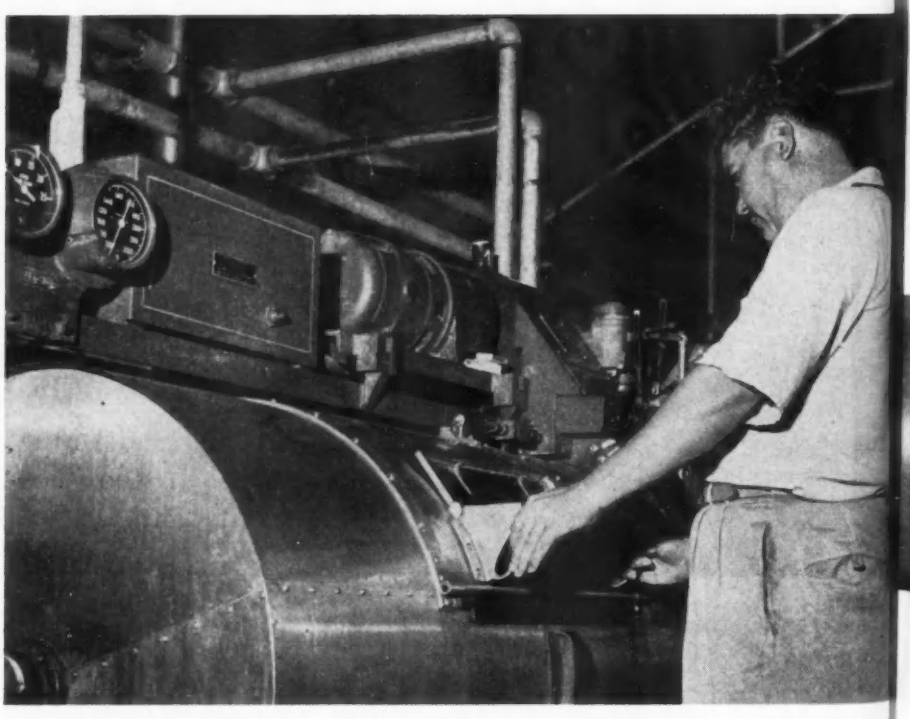
Clean shirts and steaks. "For men only" may be a misleading description of Tibú. While it is a jungle outpost, it is a modern camp. Married men, however, prefer to have their families live in a modern Colombian city, Cucuta, only 25 minutes to the south by air. There are few things about the camp itself to remind one that Tibú is any different from other places where oil is produced.

With considerable frequency the dining room menu lists steaks, fancy salads, the best of local fruits and ice cream dripping with one or a half dozen toppings. South American oil men who have lived in camps all over the continent swear enviously that better food cannot be found. The camp's laundry gives one-day service, operating on a 24-hour schedule and processing 1000 pounds of clothing daily to assure every man fresh garb against the tropical humidity.

Tibú boasts of modern six-man cottages surrounded by spacious neatly trimmed lawns and clipped hedges. Flowering shrubs add further beauty to the camp. Oil-surfaced roads connect various parts of the camp which, in addition to living quarters and work areas, consists of a hospital, commissary, club, theater and athletic fields. There's some malaria in the deep jungle sites and a rare case of yellow fever now and then, but thanks to a vigilant medical staff Tibú itself is free from both diseases. Camp water is as safe to drink as in Stateside cities.

In spite of its jungled surroundings, Tibú is not isolated. Colpet's three 28-passenger airplanes ply back and forth between Tibú, Rio de Oro, another Colpet camp farther north, and the company's headquarters at Cucuta. During the six-month rainy season, launches towing 65-foot barges ply the circuitous waterways between Maracaibo, in Western Venezuela, and Tres Bocas, Tibú's nearby river port. A good oil-surfaced road leads 37 miles to Puerto Leon, just south of the all but abandoned Petrólea camp. From Puerto Leon it is four and one-half hours into Cucuta of 35 miles of narrow-gauge track of the Cucuta Railway.

Weekend commuters. The most frequented means of transportation to and from Tibú is the airplane. The airstrip near Tibú's main gate becomes the scene of great activity on Saturday afternoons as the "Cucuta airlift" starts the weekend exodus from camp. The men don't return until Monday morning when the first Tibú-bound



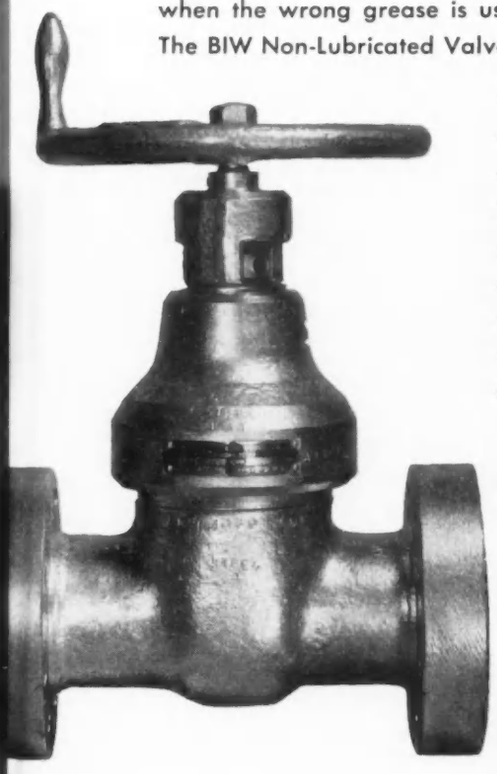
MODERN LAUNDRY works around the clock to keep men supplied with clean clothing—an essential for good health in the tropics.

WHY PAY TO USE YOUR OWN VALVES?

BIW Non-Lubricated GATE VALVES

CUT VALVE MAINTENANCE COSTS

You needn't dig into your pocket for more money every time you use a BIW Non-Lubricated Gate Valve. You can use these valves **free.** You are free of the man with the grease gun. Free of an inventory of grease. And free from the problems that come when the wrong grease is used or when greasing is forgotten. The BIW Non-Lubricated Valve makes **economy** a fact.



With the economy of non-lubrication you get the dependability of the simplified, rugged BIW design. The low opening torque required, the effective metal to metal seal, and low maintenance of BIW valves have been proved by more than 35,000 installations in the field.

The BIW Non-Lubricated Gate Valve comes in a full range of sizes and pressures up to 15,000 pounds test pressure! See the BIW engineer today and forget about the problem of lubricating valves.

ALCO

American Locomotive Company

Beaumont Plant—Formerly Beaumont Iron Works Company

Oil Tool Sales Office—1404 Dunlavy—Houston 19, Texas

Oil Tool Warehouses in Beaumont and Odessa

plane leaves Cucuta at 6 a.m. Colpet's planes carry up to 3000 passengers per month on these weekend junkets, and the flight safety record is as good as any airline's—only one accident in 16 years of operation and that a freight plane with no passengers during pipe line construction days.

In Cucuta, some of the employes' families live in Colpet's new housing development where about 250 families have bought homes. Others rent homes in the pleasant, fastidiously clean metropolis of about 78,000 persons. Colpet operates an elementary school up through the eighth grade at Cucuta using the Calvert system of correspondence courses taught by qualified teachers to some 40 employes' children. Colpet also maintains two "town clubs"—really refurbished homes—in Cucuta for weekending bachelors. The employes also have the service of a free medical clinic in Cucuta.

Larry Torres, formerly of Dewey, Okla., is a typical Tibú citizen. Torres' wife lives in Cucuta, where they have a home. Larry is there every weekend as he has been for the past six years. Bright and early every Monday morning, though, it's back to Tibú, where he puts in a full week as drilling superintendent.

Tibú has 110 American staffers, another 50 Colombian technicians and about 1700 workers. In all respects, it is a mature community. Its average American is in his mid-40's, although the age range runs from 22 to 55. Most Tibúans have been on Colpet's payroll for six years. There are a few 10 and 15-year veterans who can remember rougher living before this part of the jungle was tamed.

BARGES FROM LAKE MARACAIBO supply Tibú with heavier equipment needs, docking at Tres Bocas, a few miles south of the camp.

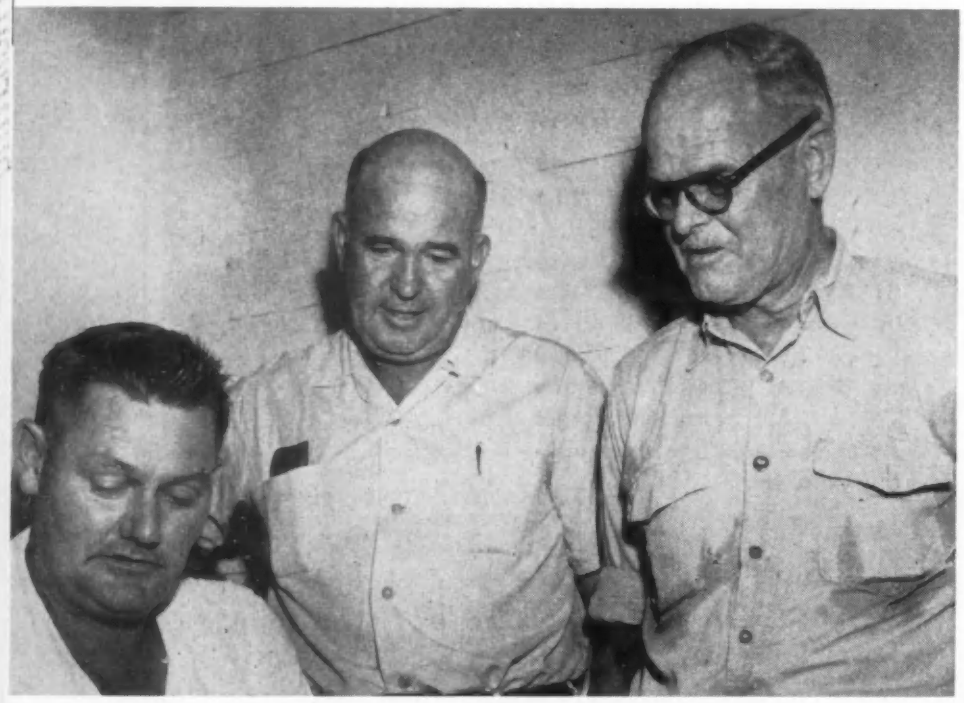
Monday through Saturday the workday begins at 6:30 a.m. with the wake-up whistle at 5:30. Five days a week the men knock-off at 4 p.m. and the Saturday working day ends at noon. The eight and one-half hour weekday and the five and one-half hour Saturday totals 48 hours, the standard work week. The extra half hour on weekdays permits the long weekend in town.

Colombia's peso is officially quoted at 2.50 to the dollar and prices in Colombia in the postwar period have been on the increase just as they have almost everywhere. At camp, a haircut costs 35 cents; a bottle of good Scotch, about $6; soft drinks, less than four cents, and U.S. cigarettes, 33 cents a pack.

After working hours, most Tibúans can be found at the club where they linger over pool tables, swat ping-pong balls, thumb the library's volumes and take poker, cribbage, dominos and major league baseball seriously. The latter, as well as college football games and other Stateside radio programs, reach Tibú loud and clear by way of the Armed Forces Radio beamed from California. The club, which is also open during the working hours, serves free snacks, but no beverages harder than beer.

Colpet's policy on leaves is a 66-day biannual vacation with round-trip fare to the U. S. for the entire family paid by the company. There are also excellent vacation resort spots within South America frequented by Colpet employes.

—The End



DISCUSSING TRANSPORTATION PROBLEMS are, left to right, W. A. (Bud) Black, truck supervisor; C. E. Kellar, assistant transportation foreman, and Jack Barber, transportation superintendent.

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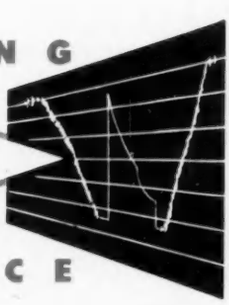

HALLIBURTON'S BEST FOR YOUR DRILL STEM TEST

What Does Australian Discovery Mean?

1953 find has stirred interest in oil circles throughout the world. But the question remains . . . is this excitement warranted? Will Australia become an oil producer? Here are some answers from a geologist who has a first-hand knowledge of the prospects and problems.

By WERNER F. SCHNEEBERGER,
Anderson-Prichard Oil Corporation, Denver

DISCOVERY OF OIL in commercial quantities in Western Australia last fall caused world-wide excitement in oil circles despite the fact that the well which followed was a failure. West Australian Petroleum Limited announced after Rough Range 2 found only salt water that its efforts would continue. While excitement occasioned by Rough Range 1 discovery was lessened, interest in the region's oil-producing possibilities remains high.

But is this interest warranted? Will Australia now be on the road to becoming an oil producer? That is the No. 1 question in a country which has seen active drilling for oil for many years and in many areas but no shows of sufficient importance to warrant more intensive exploration.

Peculiar conditions, both stratigraphic and structural, prevail there. The geologist not familiar with them must unlearn many things he might have taken for granted in other parts of the world. That requires imagination and a courage to break away from preconceived ideas.

Australia, as a fragment of the ancient Gondwana Land, shares in its geologic history many characteristics with the other parts of the former South Continent. For its greater part it is a shield built up of Archean and pre-Cambrian rocks which was repeatedly inunated by the sea, whereby in areas of intercratonic or epicontinental basins considerable thicknesses of sediments were deposited. However, because of the stability of the basement, folding as a rule was slight, and faulting is the prevailing type of structural dislocation.

Only in its eastern part, now occupied by the Coastal Cordillera, did geosynclinal conditions prevail. Great thicknesses of sediments were deposited in the Tasman geosyncline and subsequently folded in several periods of orogeny.

Six areas (See Figure 1) which offer different sets of stratigraphic and structural conditions are:

1. Northwest and Coastal Plain basins of Western Australia, with prospects in the upper part of the Permian section and overlapping Mesozoic.
2. The Fitzroy basin in northern Western Australia, with possibilities in the Ordovician and in Mid- and Upper Devonian reefs.
3. Bonapart Gulf basin, with possibilities in the Paleozoic.
4. Eastern part of the Great Artesian basin (Queensland), with some as yet inadequately tested possibilities in the marine, upper part of the Permian and Permian/Mesozoic overlap.
5. Sydney basin for gas possibilities in the Permo-Triassic.
6. Tertiary overlaps on the south coast of the State of Victoria.

Northwest and Coastal Plain basins. Northwest basin (see Figure 2), scene of the recent discovery, extends for about 450 miles from the Northwest Cape to the south as far as the pre-Cambrian complex near Geraldton. There, a narrow channel connects it with the Coastal Plain basin farther south. It has an average width of 100 miles and is about 200 miles at its widest.

To the east it is bordered by the pre-Cambrian Westralian shield of which it forms a downwarped part. Its western edge is submerged under the Indian Ocean.

Along the eastern slope of the basin, the stratigraphic section is continuously exposed. There the type sections of the younger Paleozoic rocks were studied, whereas the Cretaceous and Tertiary sediments occur farther to the west in the Coastal area, (see Figure 3).

Although the sedimentary record of this basin comprises the interval from Middle Devonian to Tertiary, with an aggregate thickness of at least 18,000 feet of sediments, it is not a continuous record. There are many large gaps caused by non-deposition and/or erosion.

The Middle and Upper Devonian are represented by 4800 feet of sediments i.e., a basal arkose (Nanyarra, 250 feet), a sequence of dense limestone, calcareous sandstone and siltstone (Gneudna, 1550 feet), and a sequence of sandstone- subgreywacke, conglomerate and siltstone (Munabia, 3000 feet).

There are only 1850 feet of Lower Carboniferous sediments, consisting of crystalline limestone (Moogooree, 900 feet), cherty, kaolinic subgreywacke, quartzose sandstone, siltstone and some limestone (Williambury, 700 feet), a higher limestone formation (Yindagindi, 300 feet) and ferruginous, quartzose sandstone (Harris, 250 feet).

Cyclic repetition of four arenaceous, separated by three calcareous formations is evidence for deposition in moderately deep water with repeated regressive and progressive changes of the shore line. None of the formations mentioned has the characteristics of a source formation,

PART 1

IN SPITE OF HIGH WATER

A CAT* SPREAD KEEPS ROLLING

HIGH WATER on the right-of-way has not bogged down this Bucyrus-Erie dragline powered by a rugged Cat D318 Diesel. Operating from wooden mats, the dragline continues to backfill the trench between Hawkins and Longview, Texas. Work is being done by O. R. Burden Construction Co., Tulsa, Oklahoma.

"Caterpillar equipment," reports R. M. Jones, superintendent on the job, "will last longer with less maintenance than any other equipment I've ever used."

This statement comes from experience. Up the line on this fast-moving spread, three D7s, a D8, a D8800 and a D318 are at work.

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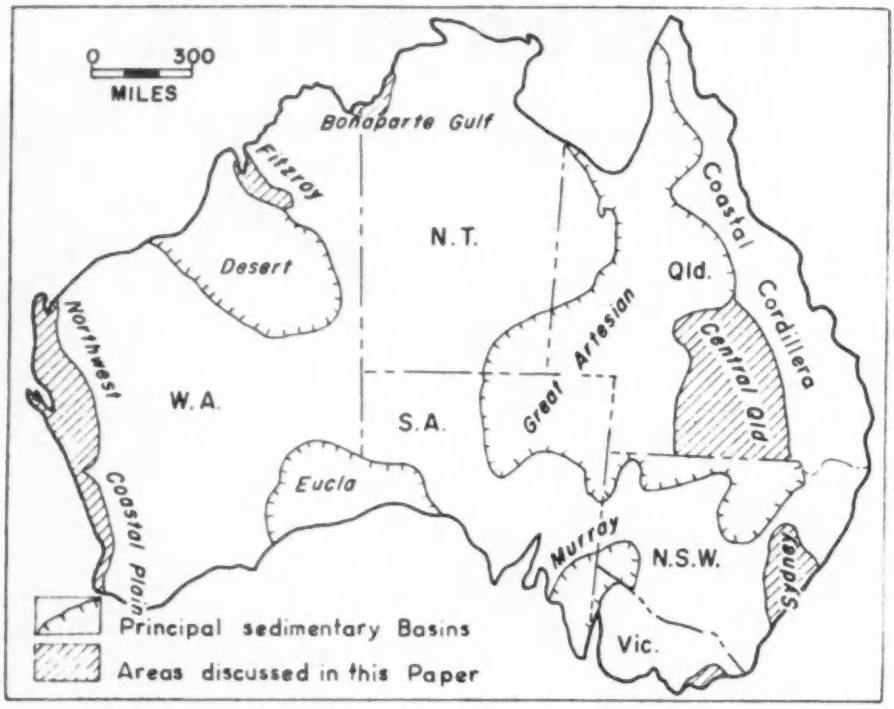
A WORD TO THE WISE— STANDARDIZE!



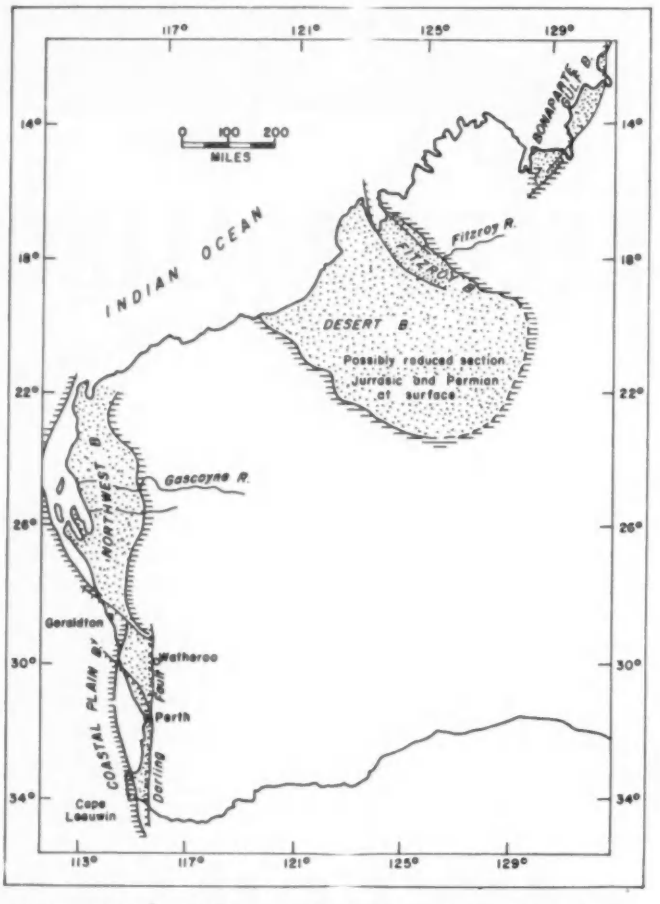


FIGURE 1

Fig. 2—Sedimentary basins of Western Australia.

at least not along this marginal part of the basin.

The Permian section is 12,000 feet thick, approximately a third of which is occupied by the glacio-marine deposits of the Lyons group (4300 feet).

Highly calcareous sandstones in the upper part of the Lyons lead over into the calcareous-arenaceous Callytharra formation (760 feet) with a rich benthonic fauna indicating well aerated water, a condition widely thought to exclude the preservation of organic material.

The uppermost part of the Permian section (7700 feet) has the most interesting facies of the whole young Paleozoic sequence. It consists of alternating sandstones, shales and siltstones. Some of the siltstones are black, highly carbonaceous and possibly bituminous. The presence of gypsum and probably other evaporites and marcasite suggest temporary land-locked, anaerobic (euxinic) conditions, similar to the ones described from the upper part of the Permian section in the northern Coastal Plain basin. (Clarke et al, 1951.) It is the only formation which to all practical purposes can be assigned the role of a source formation.

Depositional record of the Mesozoic is even more incomplete than that of the young Paleozoic. Glauconitic sandstone, siltstone and radiolarian-bearing siliceous siltstone of Middle Jurassic and Upper Cretaceous age overlap the Permian sediments over large areas.

In the coastal region the Tertiary (Paleocene to Pliocene) is present mainly in a calcareous facies. Faunal relationship points to sea connection with Indonesia.

Neither Mesozoic nor Tertiary sediments have characteristics of a source formation, but some members show excellent reservoir conditions.

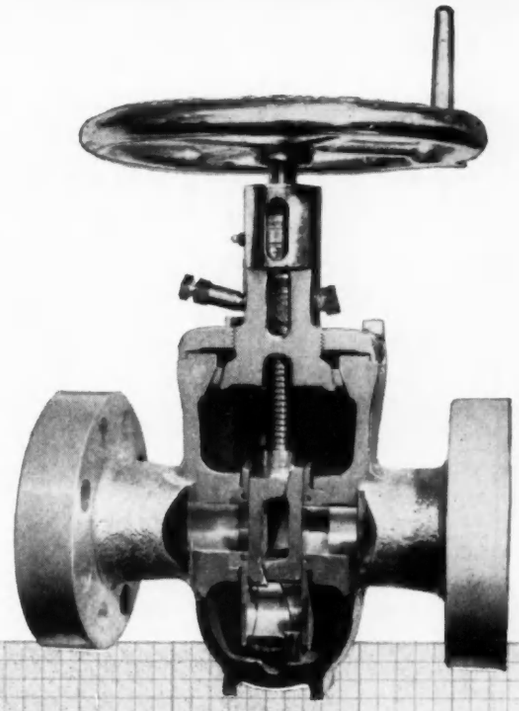
Because of the Mesozoic/Tertiary overlap, no information as to facies changes of the young Paleozoic formations basinward is available. However, indirect indication of the configuration of the basin floor was obtained through the gravimeter reconnaissance by the Bureau north of the Gascoyne River (see Figure 3) in 1950-51. There are two major gravity minima, one of —40 milligals in the eastern part of the basin, and the other of —50 milligals east of the town of Carnarvon.

There is a regional rise of the gravity values to the north which very likely coincides with a regional rise of the basement floor in that direction. Highest value of +10 milligals was obtained at a point on the west coast of Northwest Cape Peninsula. The minimum near Carnarvon has a tendency to deepen to the south. It is, therefore, probable that the deepest part of the basin is situated near the coast and to the south of the Gascoyne River. Consequently, in this area a more favorable facies of the Devono-Carboniferous sequence can readily be expected.

Configuration of the coast line and

A SEAL ON BOTH SIDES

MEANS DOUBLE PROTECTION



Two-piece parallel expanding gate construction gives positive up-and-down-stream seal.

Gates in closed position with rear skirt and seat cut back

The W-K-M design offers by far the most effective seal of any other design. In closed position, the split gate with its parallel faces, seats so tightly against both upstream and downstream seats that it is as positive a seal as a steel plate welded across the conduit. Yet, the gates move freely under all conditions when opening and closing the valve. The sketches at right illustrate the general construction of the gates.

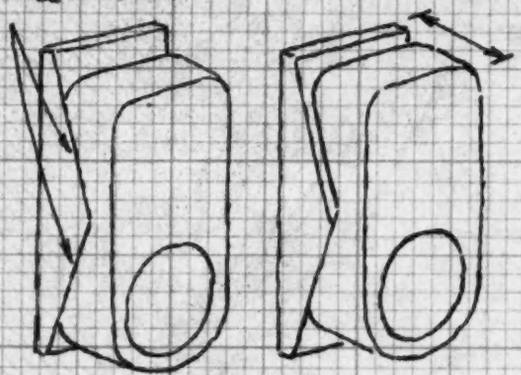
The first cross-section sketch, right, illustrates how the gates move within the valve in operating position. The distance from gate face to gate face (X) is a few thousandths smaller than the distance between the seats, thus providing for completely free running while the valve is being operated.

The second sketch shows the position of the gates when the valve is closed. Here the solid portions of the gates bear against the seats at a high pressure obtained by the stem screw and the inclined planes of the gates. It can readily be seen that there is a complete seal on both sides so that direction of flow or pressure have no effect whatever on the perfect seal of the valve.

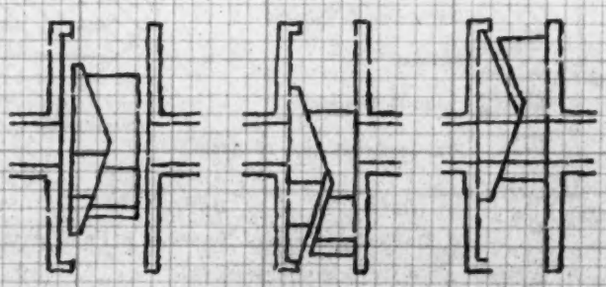
The last sketch shows the valve in open position. The same seating pressure bears against both seats, but the gate conduits are lined up with the valve conduit providing a smooth, full bore passage for the line fluid. Seating tightly on both sides prevents pressure and foreign materials from entering the body.

Why not call your nearest W-K-M Representative and ask him to show you the "tell all" small-scale working model.

All four planes in intimate contact *Now width of gates is greater*



This sketch shows the general construction of the gates. The left pair is in the operating position. Both inclined planes are in intimate contact and the distance from face to face we'll call X. The right sketch shows how the gates appear in expanded position. One gate has been moved up which increases the overall width to $X + \Delta X$, a width just great enough to provide the desired seating pressure.



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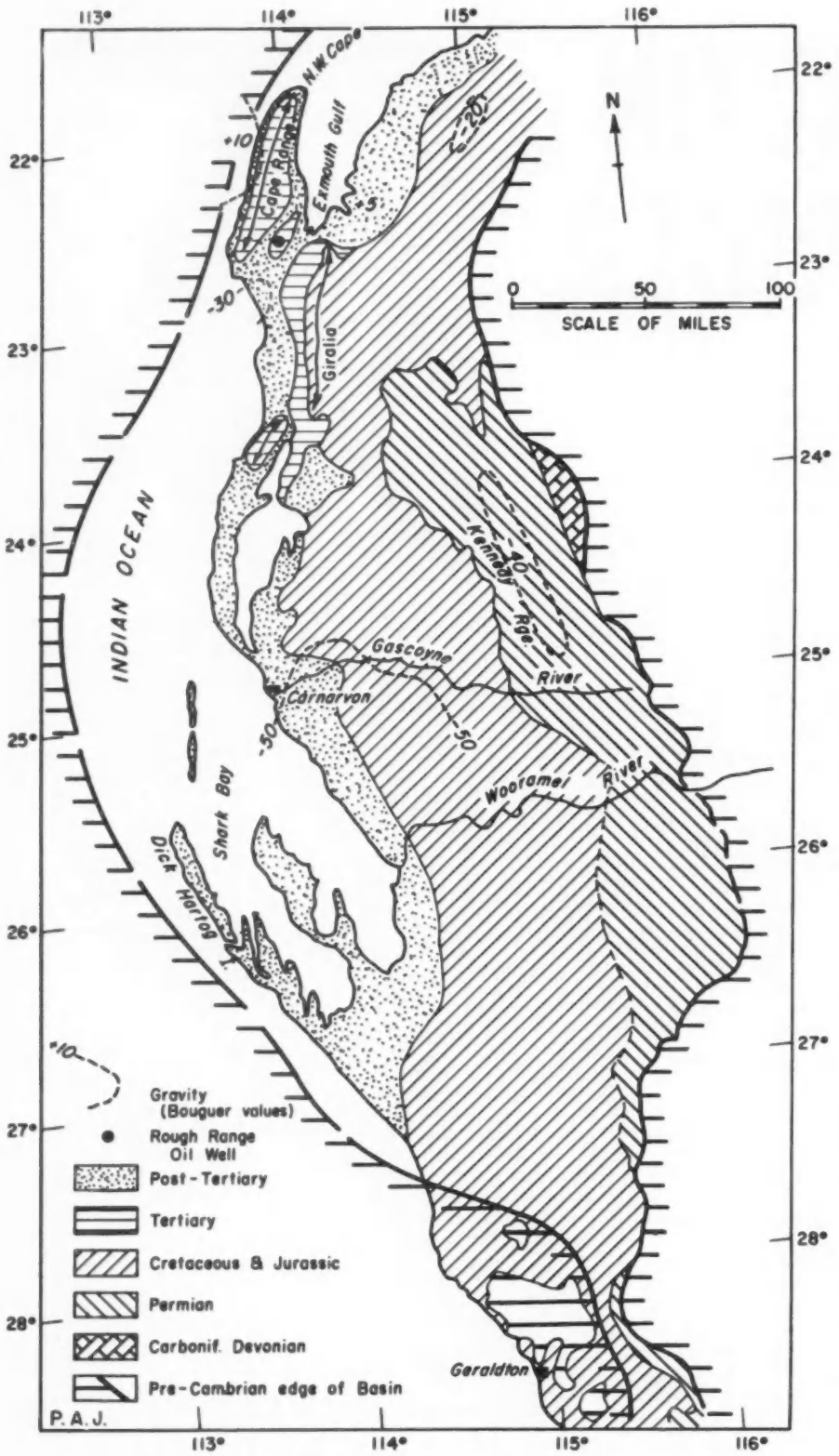


Fig. 3—Geologic map of Northeast Basin of Western Australia.

trend of the islands and peninsulas enclosing Shark Bay suggest that that bay is a submerged part of the Northwest basin, which reaches here its greatest width of approximately 200 miles.

Structure of the Northwest basin is rather simple. In its northeastern part, faulting is predominant. Local folding seems to be connected with faulting (drag).

An exception is a group of five dome-like small structures west of Kennedy Range and north of Gascoyne River, discovered and mapped by the Australian Mining and Smelting Company. These domes are in the upper part of the Permian section, partly overlapped by Cretaceous and Tertiary rocks. They do not exceed one mile in diameter and closure is of the order of 500 feet.

Gravity and magnetic surveys indicated absence of either local intrusive bodies or deep-seated salt plugs. Because of highly saline waters in wells in the vicinity and high gypsum content of shales of the upper part of the Permian, connection is seen between presence of evaporites and local doming of these strata. Although prospects for oil are doubtful, a test might prove commercial accumulations of evaporates, if not oil.

In the coastal region, folding is very evident and a number of small to large-size anticlines were mapped by Bureau geologists.

Because of their size and strong topographic expression, the large anticlines invariably attracted the attention of visiting oil geologists. The Cape Range anticline is about 60 miles long and 12 to 15 miles wide. As a 1000-feet high plateau-like range of Miocene limestone, it forms Northwest Cape Peninsula. Its east flank dips with 8-10°, whereas the west flank is flatter (3-5°).

Of similar dimensions is the Giralia anticline to the south of Exmouth Gulf. It also has a steeper east and a gentle west flank. It is closed in Upper Cretaceous rocks. Between these giant-size structures lies the Rough Range anticline, on which the discovery well was drilled. Although smaller in size, it is still 20 miles long and about 6 miles wide.

Both Cape Range and Giralia anticlines were considered as target for a first well. However, their size and shape raised doubts as to their being normal folds. Therefore, on the recommendation of the author, a detail gravimeter traverse was made and, subsequently, two seismic reflection profiles were shot across the Giralia structure by the Bureau.

End Part I

In Part 2 and 3, which will follow in subsequent issues, the author will discuss the Fitzroy, Bonaparte Gulf, East Central Queensland, Sydney, and Victoria Basins.

What's Happening

AMONG WORLD OIL MEN

E. L. GORHAM, JR., has been named manager, joint operations of The Texas Company's Foreign Producing department. His new headquarters will be in New York. Gorham was formerly assistant manager, Venezuelan Division, of Texas Petroleum Company in Caracas. He first joined Texaco in October, 1935, after completing graduate work in petroleum engineering at Louisiana State University. He was field foreman of the company's South Texas division prior to his transfer to Venezuela in February, 1939.

•

H. T. DODGE has been appointed general manager of The Texas Company's Foreign Operations department, (Western Hemisphere and West Africa). He has been assistant to the vice president since 1947.

H. T. Dodge

C. W. SAVILLE, manager - exploration of the Foreign Producing department since 1952, will succeed Dodge.

A graduate of Rice Institute, Dodge was employed by The Texas Company of Mexico, Ltd., in 1920. In 1922 he was transferred to The Texas Company's Casper Works at Casper, Wyo., where he remained until 1925. He has worked in various managerial capacities for Texaco subsidiaries and affiliates in Belgium, Holland and the Philippine Islands.

Saville, a graduate of the New Mexico School of Mines, was employed in 1937 as a paleontologist by Colombian Petroleum Company, a Texaco affiliate in South America. In 1940 he was transferred as a geologist to Texas Petroleum Company, a wholly-owned Texaco subsidiary. He was stationed in Colombia until 1952, when he was named manager—exploration, of Texaco's Foreign Producing department, with headquarters in New York.

A. A. Dill

R. V. McIntire

A. A. (AL) DILL, manager of the New York division office of Axelson Manufacturing Company, Division of Pressed Steel Car Co., Inc., has been elected chairman of the National Board of Regents of Nomads, and RUSS V. McINTIRE, New York export manager for Baker Oil Tools, Inc., was chosen secretary-treasurer of the National Board of Regents for 1954.

Dill joined the Axelson organization in 1925 as a factory representative in the Tulsa and Gulf Coast sales territories. Since then he has remained continuously with the company and its successor companies, and since May, 1927, has been in his present position.

Following a 13-year stint in the Drilling department of Belridge Oil Company in California, McIntire served in the California Sales and Service department of Baker Oil Tools from 1942 to 1946. In 1946 he was transferred to New York to his present position.

•

R. D. HOLLAND and W. H. GIBSON have been appointed assistants to division manager, Geophysical Division of the Texas Company's Producing department. Gibson will have headquarters in Houston and Holland will be in charge of geophysical operations in Western Canada with headquarters at Calgary, Alberta, Canada. Gibson joined the company in 1935 and before his new appointment had been supervisor of field operations, Houston. Holland began service with the company in 1933 and his previous position was field supervisor of Western Canada for the geophysical division.

WILLIAM F. KNODE, Calgary, has been appointed general manager of the Alberta Gas Trunk Line Company Limited. With more than 30 years experience in drilling, production and transportation phases of the oil industry, he was born and educated in West Virginia. He went to Alberta in 1938 when he acted as consultant for the drafting of the Petroleum and Natural Gas Conservation Act. He helped organize the first Alberta Conservation Board and held the position of board chairman for two years. Prior to that, in 1931, Knode served as chief petroleum engineer with the Texas Railroad Commission during its organization and early stages of operation.

Since that time he has worked in a consulting engineering capacity on both sides of the border. He returned to Calgary in October, 1952.

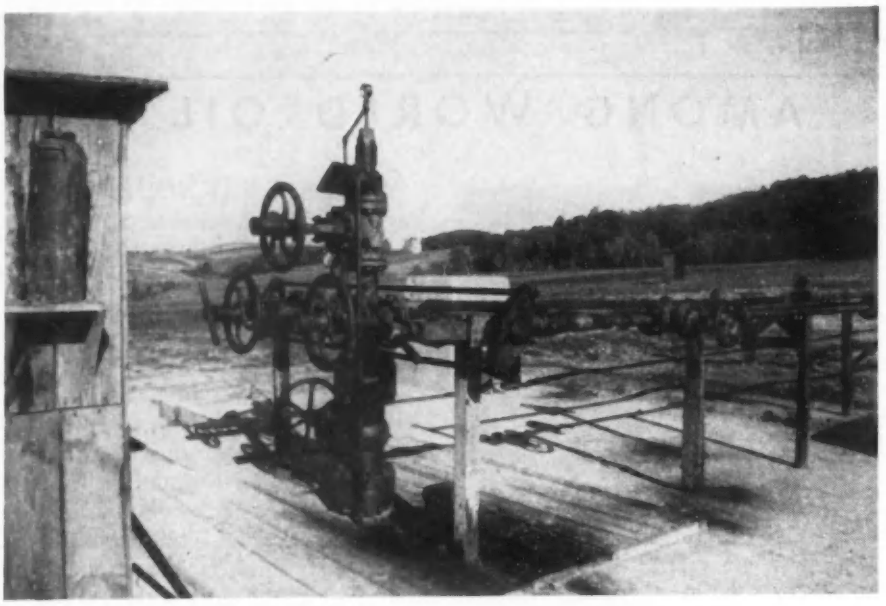
Knode is listed in "Who's Who in Engineering in the United States," is a member of the American Association of Petroleum Geologists and the American Institute of Mining and Metallurgical Engineers. He also is a member of the Calgary Petroleum Club, the Ranchmen's Club, and the Calgary Golf and Country Club.

•

WILLIAM H. PINCKARD has been elected chairman of the executive committee of California Texas Oil Company, Limited. He will continue to occupy the position of chairman of the board of directors.

Pinckard has been associated with the Caltex Group of companies since 1936, when the organization was formed under the joint ownership of The Texas Company and Standard Oil Company of California. His career in the oil business began in 1917 and about three fourths of his time since then has been spent abroad in the Far and Middle East and most of the free countries of the Eastern Hemisphere.

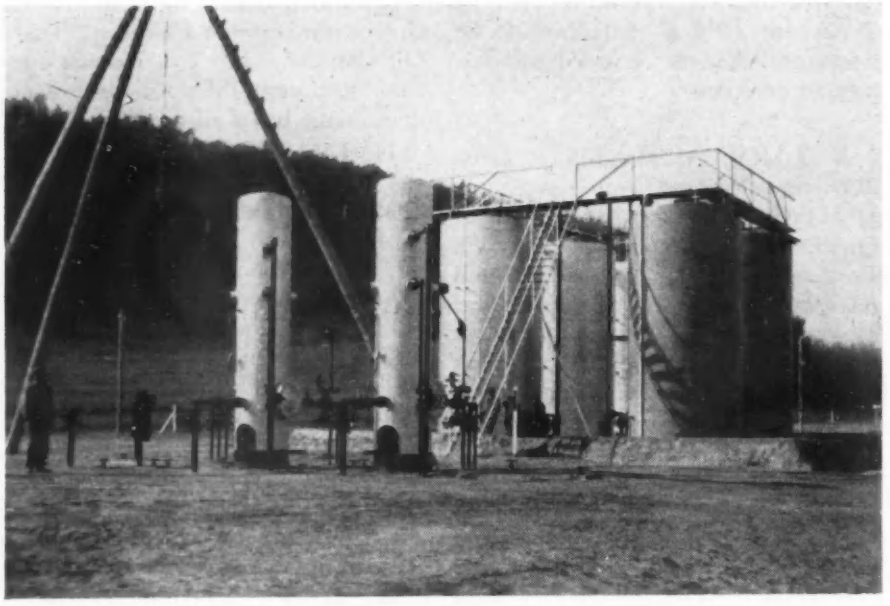
In 1940 he was elected vice president and director of the California Texas Oil Company Limited and five years later became president. He became chairman of the board in 1950.



CHRISTMAS TREE IN BUDAFAPUSZTA FIELD.

Production in Hungary . . . 17,280 or 14,550 BPD?

The Communists are claiming the former figure. But here's a field-by-field evaluation that indicates the daily average output is nearer the latter.



SEPARATION AND GATHERING TANKS IN BUDAFAPUSZTA FIELD.

By "VERITAS"*

MORE THAN EVER, secrecy shrouds all industrial activity in the countries behind the Iron Curtain, especially the oil industry. Satellite governments still issue periodic "reports"; however, the primary purpose of these statistics is to mislead the outside world as to the true state of affairs and to befuddle the local population to a point where it gives up all attempts at reasoning out the truth. This has been amply evident in the manner in which these statistics have in the past been published: in percentage increases related to percentage increases of prior years' productions!

But this year, for the first time, two Soviet satellites, Hungary and Roumania, published official crude production figures in other than unintelligible percentages.

Nevertheless, it would appear to be the wisest course to follow under the circumstances, to accept official satellite statistics only to the extent that they can be substantiated by reliable data obtained from other sources.

Crude oil production—1953. "Szabad Nep" (Free People), the chief Communist daily of Budapest, said January 27, 1954, that Hungary's crude production for 1953 amounted to 6.3 million barrels, an average daily output of 17,280 barrels. This figure is near Hungary's peak production of 6.4 million barrels in 1943, and is 66 percent greater than 1947 production of 3.8 million barrels, or 10,500 barrels daily.

Hungarian oil production was developed by the European Gas and Electric Company, a Standard Oil Company (New Jersey) affiliate, through its operating subsidiary, the Magyar-Amerikai Olajipari Rt. (Maort). Maort obtained a concession from the Hungarian government on 8 million acres in the section of Hungary called "Transdanubia"—the western part of the country bordered on the east by the Danube river. The Hungarian Communist government took over the management of Maort in September, 1948, and nationalized the company in December, 1949.

While it is reasonable to assume

* Translated from Latin means "truth." Author, whose knowledge of Hungary qualifies him for the deductions and data herewith published, requests anonymity.

that the country's production has been increased due to the intense drilling campaign undertaken by the government after 1948, the official claim of an average of 17,280 barrels daily for 1953 is subject to considerable doubt. Based on information so far available and taking the most optimistic view of the over-all situation, a daily average production of 14,550 barrels would appear to be a more realistic figure. See Table 1.

The 1953 production represented an increase of 1 million barrels, or 23 percent over the 1952 annual production of 4.3 million barrels. The increase of 300,000 barrels in 1952 from 1951 was due to the discovery of the Gallenhaza field in 1951.

Field evaluations follow:

• **Old Maort Fields:** While it has been rumored at various times that production of the old Maort fields is declining, it has been reliably reported that the Communists succeeded in maintaining production at close to 4 million barrels a year by drilling a large number of "fill-in" wells. This was apparently done at Soviet demand.

In the opinion of Hungarian experts, no further wells would have been required to get the known crude reserves (about 26 million barrels at the end of 1948) out of the ground, based on rational production methods. It must also be assumed that in the meantime deeper horizons may have been tapped and some old wells reactivated in a further effort to maintain production at 10,960 barrels a day.

• **Ujfalu:** This is an old field discovered by Maort in 1941 and abandoned as non-commercial in 1944. During this period total production amounted to 13,400 barrels. Communists reopened this field and claim to have found oil in deeper horizons with a daily production of 50 barrels.

TABLE 1

Oilfields	Est. Production-1953 Daily Averages, Bbls.	Annual Totals, Bbls.
Old Maort fields, also known as Lispe fields, (Budafapuszta, Lovaszi, Hahot)	10,960	4,000,000
Ujfalu (reactivated Maort field)	50	18,000
Bukkszek	60	22,000
Gellenhaza	1,400	511,000
Mezotur	2,040	745,000
Eger-Gyongyos	40	15,000
Totals:	14,550	5,311,000

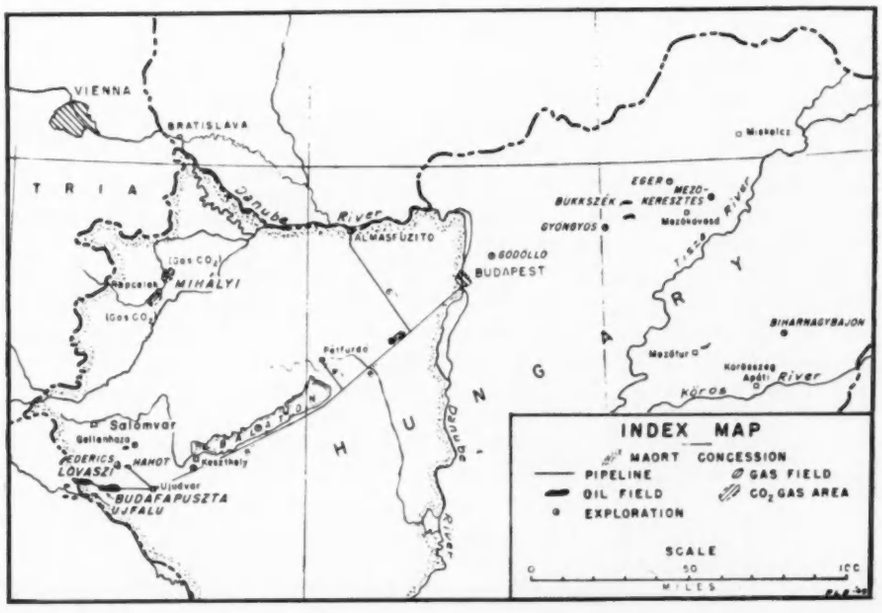
CAMP HOUSES IN BUDAFAPUSZTA FIELD.

• **Bukkszek:** Hungarian government geologists discovered this field in 1937. It is a faulted area with small lenses containing oil. Producing depths range from 250 feet to 1500 feet. Total production to the end of 1953 is estimated at 150,000 barrels. This field had been neglected until the Communists took over in 1948. Previous production varied between 30 barrels to 200 barrels daily. It is not believed that present production is more than 60-70 barrels per day.

• **Gellenhaza:** Discovery of this field dates back to 1951. It is about nine miles north of the Hahot field on a secondary gravity high of the Salomvar gravity anomaly. Maort drilled three wells here, one during and two after World War II. Good oil shows were found at 7000 feet, but no production. Reports received early in 1951 indicated that heavy oil was found at 6600 feet at Nagylengyel, near Gellenhaza.

During 1953 about ten wells were drilled in the general area and authorities ordered the construction of 150 homes for workers and their families. This is a similar structure to that of Hahot and would not appear favorable for large accumulation of oil. Production and other data seem to be in line with what could have been expected in this area. Daily production of 1400 barrels appears plausible.

• **Mezotur:** First reported in 1952, this field is situated on the Great Hungarian Plains about 80 miles east south-east of Budapest. There is a gravity high about nine miles north-east of Mezotur at Turkeve. It is rea-



sonable to assume that it is here that the producing wells were drilled.

No geological data is available on this area, nor has it been possible so far to obtain confirmation of this discovery from other sources. Last reported production was 2040 barrels daily.

• **Eger-Gyongyos:** These towns are situated in the northern part of Hungary along the Matra Mountains, and first reports in 1951 mentioned completion of two producing wells somewhere in this area in that year. General geological conditions in this section are probably similar to those of Bukkszek, and there can be little hope for larger production. Average daily production is estimated at 40 barrels.

Exploration activities. The Hungarian government undertook a tremendous exploration and drilling program during the past few years with a view to discovering new oil reserves. Soviets assisted by supplying a small number of drilling rigs and by sending a delegation of geologists to speed new field discoveries. Locations where exploratory drilling activities have been reported are:

• **Godollo**—a small town about 12 miles northeast of Budapest. There is a gravity high a few miles west of the town.

• **Biharnagybajom**—about 100 miles east of Budapest and 30 miles southwest of the Korosszegapati structure, where the Germans drilled several wells during World War II, resulting in gas discovery. After entry of the Soviet army, further drilling was undertaken here under Soviet guidance, but without success. This is a buried hill structure similar to that of Hahot. If other geological conditions are also similar, large accumulations of oil in this structure are not likely. In 1951 Hungarian propaganda claimed that a field was discovered here much richer than the Lispe fields (old Maort fields). However, nothing further has since been heard about this supposedly rich field.

• **Mezokeresztes**—about ten miles south southwest of Miskolcz. Torsion balance survey indicated a very pronounced large gravity maximum in the vicinity of Mezokovesd, a few miles west of Mezokeresztes. A few scattered data available also indicate another gravity high at Mezokeresztes.

In 1939 bitumen was found in a well at Tard, about five miles north of Mezokovesd. However, a well drilled here to 3000 feet found no oil, and was abandoned. It was reported in 1951 that drilling was being conducted at Mezokeresztes with 17 rigs.

• **Lake Balaton**—it was reported early in 1953 that the Hungarian government has been prospecting at the southeast corner of Lake Balaton, between Keszthely and Fenekpuszta, about five miles south of Keszthely. First experiments undertaken in August, 1952, were called promising.

The government ordered a ship specially equipped for underwater drilling, which was supposed to have gone into operation at the beginning of 1953. The assumption appears to be that the Lispe fields may extend under the basin of the lake, but this has no geological foundation. Maort drilled five wells at Ujudvar, situated 18 miles southwest of Fenekpuszta and between Lake Balaton and Lispe, all of which were dry holes.

Drilling program 1953-54. In view of the present forced production methods applied, Communists are compelled to continue drilling at a very high rate in order to find new fields, maintain and, if possible, increase production. The 1953 program called for the drilling of 853,000 feet, but it is extremely doubtful whether this program was carried out because of the general industrial slowdown resulting from the East German uprisings in June, 1953.

For 1954, the drilling program was fixed at only 250,000 feet, a 73 percent drop from 1953. While the official reasons for this drastic cut are not known, it is suspected that nondelivery of promised Soviet equipment and the general industrial slowdown are mainly responsible for it.

It remains to be seen whether the present production rate can be maintained for a longer period of time in view of the complete disregard of rational production methods and without the discovery of more prolific new fields. —**The End**

a WORLD of OIL

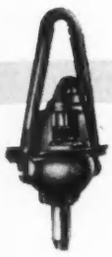
By DON KLIEWER, World Oil Staff

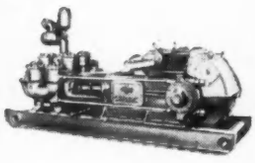
Uruguay: Administracion Nacional de Combustibles, Alcohol y Portland, a government entity for the administration of the oil monopoly, will begin drilling this year and in 1955 exploratory tests for which services will be contracted. Uruguay has no commercial crude production . . . Also scheduled: increased capacity of the nation's single refinery, current capacity 25,000 barrels, through erection of one new topping unit, one vacuum unit and a catalytic cracking unit.

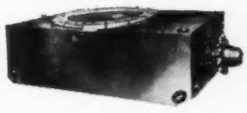
Germany: Deutsche Erdoel-Aktiengesellschaft's exploratory test Oerrel-Sued 2, 1.8 miles south of Oerrel village, Hanover province, has flowed oil from Dogger beta sandstone at 4571-4584 feet . . . A recent test of the 1953 wildcat Meerdorf 1, northwest of Brunswick, has indicated a gas bearing sandstone of the Dogger beta with a thickness of from three to six feet at about 4900 feet . . . Twenty-two wells were reported successful completions in May, including two tests Vechelde 2a and Ruehme 11, as well as extension wells Ploen 10, Itterbeck-Halle 4 (gas), and Ampfing 3 (gas). Total footage drilled amounted to 190,766 feet for the month . . . In regular use now is the newly-laid 25-mile natural gas pipe line from Pfungstadt field, near Darmstadt, to Farbwerke Hoechst, where the gas is processed . . . Heimertingen 1, variously reported as a "major oil discovery in Bavaria," has been preliminarily abandoned after bailing tests yielded only about 30 barrels of molasse oil.

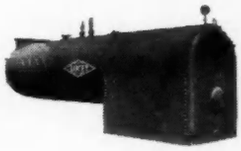
Iran: Idemitsu Kosan Company of Japan has resumed the purchase of disputed Iranian oil, it has been reported.

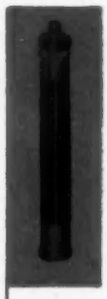
Mexico: A gas pipe line connecting Poza Rica, Veracruz and Monterrey via Tampico will be built by Petroleos Mexicanos, government oil monopoly,











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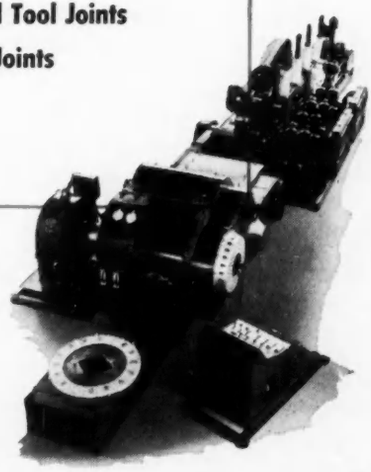

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Shell Oil Company Photographs

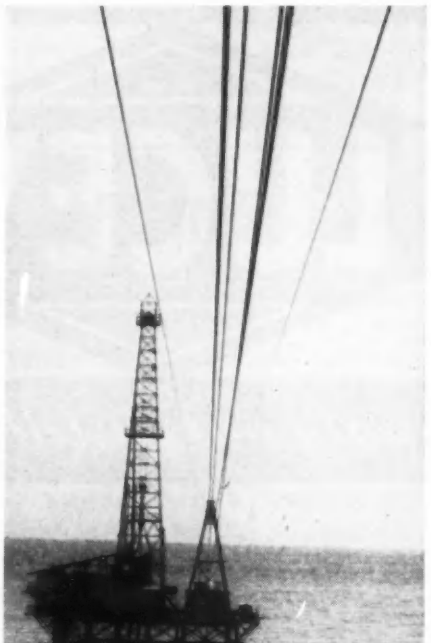
MARINE DRILLING PLATFORM (right) of Seria oil field extension being drilled by Shell Oil Company in South China Sea, about a mile off coast of British Borneo. A tubular steel jacket was carried to the location and fixed securely to sea bed. On this foundation, a platform was built from which four separate submarine wells can be drilled. Above is aerial ropeway showing transporter car in transit to drilling site. A link with shore provided by ropeway makes platform accessible during stormy weather prevalent in South China Sea.

with line pipe from France. Of the 3500 tons ordered, about half has been delivered in Tampico . . . Construction of a refinery in Guaymas, on Mexico's Pacific coast, is scheduled to begin immediately, with the site dictated by the fact that distribution of gasoline and oil through the northeast zone is costing Pemex $11 million annually . . . Drilling is programmed in Baja California, across the Gulf, resulting from the optimistic reports of geological studies throughout the past several years.

Pakistan: Chakwal 5, Pakistan Petroleum's West Pakistan test, has almost reached the base of the Sakesar limestone at 8600 feet, but testing results are not encouraging . . .

Nicaragua: Cuban Oil Basins, Inc., reportedly has been granted exclusive rights to explore for oil and natural gas in Nicaragua for three years.

Bulgaria: Further testing of crude deposits discovered late in 1952 in Shabla, Rosowo and Rogatshevo areas indicates larger deposits of crude may exist, Communist sources claim, although no actual oil zone was discovered . . . Work is continuing in the Dobrudga area, where Soviet geologists believe oil will be found.



Switzerland: This fall, C. Deilmann Company, Bentheim, Germany, will resume operations at the Altishofen well, drilled to 6076 feet without results in 1952, and will drill to the crystalline underground layers below the molasse layer where the well was stopped.

France: Esso Standard SAF's third test well, Parentis 3, is producing 3400 barrels daily of sweet crude at 8000 feet, approximately the same rate as Parentis 1 discovery well.

Australia. West Australian Petroleum, Ltd., whose second Rough Range well was a failure when completed to the same depth as the Rough Range 1 discovery well — 3605-3620 feet — has indicated it will continue efforts to find commercial production in the area. However, the company said Rough Range 2's results will cause a revision of future drilling plans.

Deep Rock, Sterling Oil Will Drill in Cuba

A joint exploration and development program on about 5.2 million acres of Cuban concessions will be conducted by Deep Rock Oil Corporation and Sterling Oil of Oklahoma, Inc. Geological studies now are under way to determine sites for initial wells, the first of which will be drilled this year.

This announcement follows completion of Echevarria 1 in Jatibonico basin, Las Villas Province, in the center of the island which was brought in by Cuban interests and Kerr-McGee Oil Industries, Inc., for five barrels an hour.

Early this year Sterling acquired the concessions from Caribbean Petroleum Associates, Inc., after the latter firm had completed a three-year geological study of the island.

American International Drilling Sicily Test

According to August cable advices from Sicily received by Macmillan Petroleum Corporation, Aragona 1 was spudded in on July 28, and was drilling ahead at 900 feet. This exploratory test is located on Mediterranean Oil Company's (owned 65 percent by Gulf Oil Corporation, 35 percent by Macmillan) Aragona-Licata permit. The drill site selected after almost a year's seismic work is about three-fourths of a mile northeast of Joppolo village, near Aragona

town in the central sea coast area of southwestern Sicily.

The well is being drilled by American International Fuel and Petroleum Company, a Gulf Oil Corporation subsidiary.

American International has scheduled a deep test well on Mediterranean Oil's Comiso permit to begin drilling about September 1. This permit was transferred to Mediterranean Oil by Macmillan in exchange for drilling a test well on this property at no cost to Macmillan.

Two successful wells have been drilled by Gulf's subsidiary in the Ragusa area about 1¾ miles east of the central-western Comise permit boundary. These two wells, according to unofficial estimates, will probably produce 500-700 barrels of 19-23 gravity crude daily which can be handled in the RASIOM (Sicilian Oil and Minerals) plant at Augusta, Sicily.

According to recent press dispatches, the RASIOM refinery is handling crude shipped in from Venezuela and the Middle East. Gulf's Kuwait crude has been going to the plant.

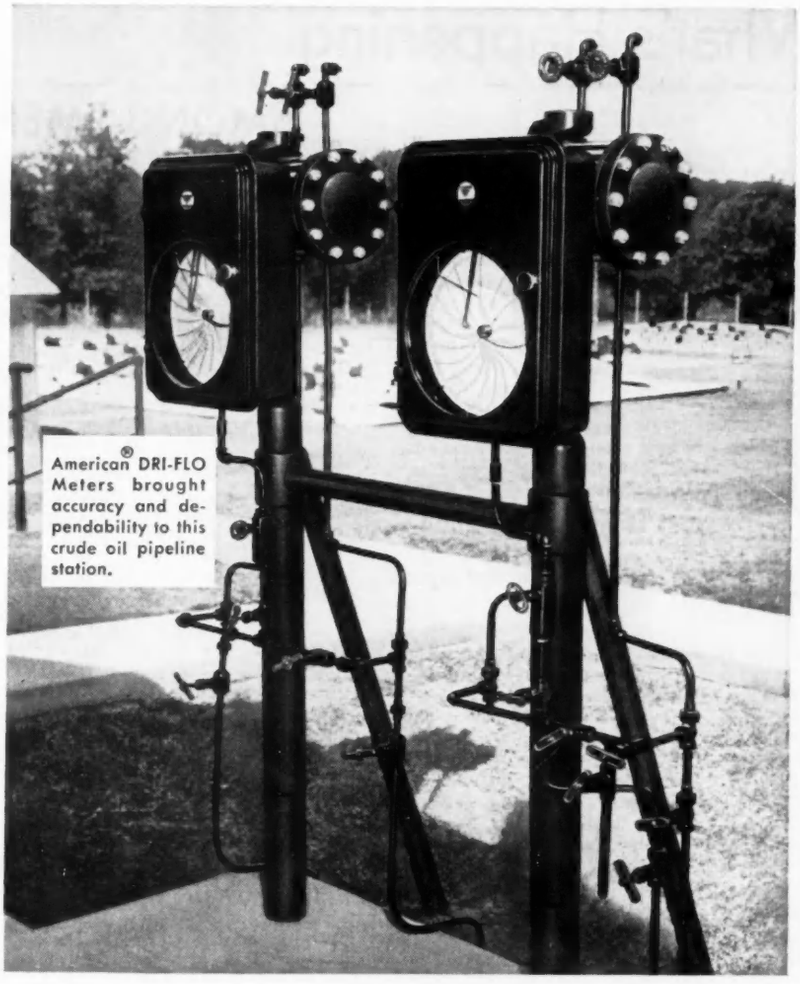
A third well in this field is now being drilled by Gulf's subsidiary near present production.

Anglo-Iranian Oil Company has discovered oil in the Ragusa area at 9800 feet, according to a news report which indicated that regular production was awaiting machinery from the U. S. Macmillan officials have information that present status of the AIOC Vittoria well is that drilling operations were suspended after an unsuccessful fishing job. It is reported the well had previously obtained oil indications from about 1300 feet of dolomite at 8582 feet.

Drilling Scheduled on Lakes Huron, St. Clair

Pan Western Oils, Ltd. (Toronto and Vancouver) and Coastal Caribbean Oils, Inc. (American) will begin drilling in the water-bottom lands along the Canadian shore of Lake Huron and Lake St. Clair on the southwest peninsula of Ontario.

Pan Western has acquired exploratory oil and gas licenses covering approximately 140,000 acres in the area. Acreage and exploration costs will be shared equally by the companies.



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What's Happening

AMONG MEN IN THE INDUSTRY

Edward H. Salrin

Edward H. Salrin has become associated with the firm of **Lehman Brothers** and will make his headquarters in the First National Building, Tulsa. Salrin, who has retired from active business management, is widely known in the U. S. and was with Tide Water Associated Oil Company and its predecessor for more than 40 years. He retired in April, 1954, as vice president and director of Tide Water and chairman of the Mid-Continent operating committee.

•

Charles F. Gates has been advanced to chief production engineer for **General Petroleum Corporation's** Production department. Gates first joined General Petroleum in 1938. He worked on oil field drilling operations until 1940 when he was transferred to production offices in Bakersfield, Calif., as an engineer. In 1949 he became senior production engineer at Vernon, Calif., the post he held until his promotion.

•

John L. Ferguson, consulting geologist of Tulsa, has joined **Buffalo Oil Company** as vice president and manager of exploration. Buffalo's main offices are now in Dallas, but the company plans to move its headquarters to Tulsa later this year. Ferguson has served as consultant on exploratory problems since resigning early this year as vice president—land exploration for Deep Rock Oil Corporation, Tulsa, a position he held for 3½ years. Previously, he was in exploration activities with Amerada Petroleum Corporation for over 20 years.

•

Lion Oil Company has announced transfers and additions of personnel in Lion Oil Company's Rocky Mountain region. In Denver **Francis C. Adams, Jr.** has been transferred from regional scout in the Rocky Mountain region office to landman in the Denver district office. **Duane J. Magee** has been moved to Denver and advanced to regional scout; **O. Ray Murphy**, advanced from draftsman in the Bismarck (N.D.) district office to production clerk in the district office at Fort Morgan, Colo. **Edgar Spelmanis** replaces Murphy in Bismarck. **John T. Johnson** has joined Lion Oil as geologist in the Casper district office.

•

J. P. Bailey has been appointed to the newly-established position of senior geologist (special projects) for the Southern district of **Standard Oil Company** of California's Exploration department. He will continue to make his headquarters in Los Angeles. Succeeding Bailey as Southern district geological supervisor will be **E. C. H. Lammers,** who has been district supervisor in Salt Lake City. Lammers' post will be taken over by **S. J. Kriz**, previously area geologist at Ojai.

Roy H. Langford has been appointed assistant to Dan F. O'Rourke in the operation of the **D. F. O'Rourke Drilling Company,** with offices in the National Bank of Tulsa Building, Tulsa. During Langford's 20 years in the oil industry, his experience has included production, oil field supply, service, and drilling operations. Langford was educated at Tulsa University and served during World War II in the U. S. Air Corps.

Roy H. Langford

•

C. B. Smith, Jr., Casper, Wyo., division geophysicist for **Continental Oil Company**, has been appointed acting assistant regional geophysicist for the company's Rocky Mountain region with headquarters in Denver. **C. M. Ferree,** Denver, geophysical supervisor for Conoco, has been appointed acting division geophysicist at Casper. Smith joined Conoco in 1946 and served on exploration crews in Oklahoma and Texas before becoming geophysical supervisor in Denver in 1951. He was promoted to division geophysicist at Casper in 1952. Ferree became associated with Conoco in 1948 and served with geophysical crews in Texas, Wyoming and Colorado before his promotion to geophysical supervisor at Denver this year.

•

George W. Marshall, Jr., who has been associated with Continental Oil Company's oil and gas exploration since 1948, has been promoted to regional geologist for Conoco's southwestern region, with headquarters in Fort Worth. Marshall succeeds **W. O. Ham, Jr.**, recently promoted to assistant regional general manager. Marshall joined the company as a geologist at Midland in 1948 and later held other geological positions at Fort Worth and Roswell, N. M., before becoming assistant regional geologist in 1952.

•

William W. Butler has been appointed chief geophysicist for the Central division of **Tide Water Associated Oil Company** with headquarters in Tulsa. Butler has been employed as assistant chief geophysicist by Tide Water in Houston, since 1945.

•

Lloyd F. Bayer and **Fero Williams** have been appointed senior vice presidents of **Tide Water Associated Oil Company.** Bayer has been with Tide Water since 1916 and for several years past has served as vice president in charge of the company's Western division. He is also a member of the board of directors. Williams was elected to Tide Water's board of directors in 1952 and in May, 1953, became vice president and controller. Bayer and Williams will continue to make their headquarters in San Francisco.

Rollin Eckis, chief geologist for **Richfield Oil Corporation** during the past eight years, has been appointed manager of exploration succeeding **Frank A. Morgan.** Eckis has been associated with Richfield since the formation of the company's Exploration department in 1937 when he was named district geologist, Northern division, with headquarters in Bakersfield. In 1946 he was appointed chief geologist and has served in that capacity until the present. As manager of the Exploration department, Eckis will be in charge of all exploratory operations for the company, including geology and land acquisitions.

Rollin Eckis

•

Robert S. Moehlman, vice president and member of the board of directors of **Austral Oil Exploration Company Incorporated,** has been elected to the newly-created office of executive vice president. Prior to his association with Austral, Moehlman was chief geologist for South American Mines Company. **James H. McGuirt,** chief geologist for the company since 1951, has been elected vice president. Formerly he was associated with the Research Division of the Louisiana Geological Survey, was assistant professor of geology at Louisiana State University, and was with Magnolia Petroleum and Tide Water Associated Oil Companies before joining Austral. **C. Wardell Leisk,** general superintendent, has been elected vice president. He was associated with the Texas Company, Hendrickson Oil Company and was general superintendent of operations for George W. Strake before joining Austral in 1952.

•

Continental Oil Company's western region Exploration department has announced the promotion of three men. **Lloyd L. Dodds,** Los Angeles, landman, is promoted to assistant regional land superintendent. **Robert K. Hardesty,** Olympia, Wash., landman, is promoted to division land superintendent with headquarters at Olympia; and **Marc O. Miller,** Los Angeles, geophysicist, promoted to geophysical supervisor.

•

Houston Oil Company of Texas has announced the election of **Richard A. McDonald** of Oakland, Calif., to its board of directors. McDonald formerly was executive vice president of Crown Zellerbach Corporation and is now serving as director and consultant of that concern. He is chairman of the executive committee of the East Texas Pulp and Paper Company which is owned jointly by Houston Oil Company of Texas and Time, Incorporated.

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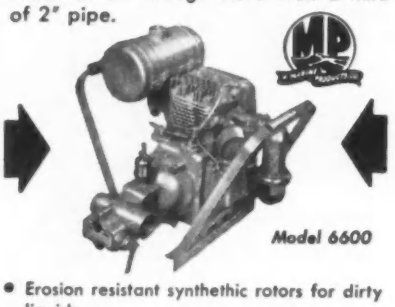

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W. M. Saxon

Harris W. Van Zandt

The Pure Oil Company's Producing division has announced the retirement of **Harvey J. Lowe,** division manager. He will serve as division advisor until Jan. 1, 1955. **W. M. Saxon,** former manager of the Michigan Producing division which is now a part of the Western Division, will succeed Lowe as division manager. Saxon is now manager of the Rocky Mountain Producing division. **Harris W. Van Zandt,** associated with Pure Oil's Texas Producing division for many years, will succeed Saxon in the Rocky Mountain post. Van Zandt is now assistant manager of the division with headquarters in Billings.

•

J. W. Nobile has been appointed production superintendent for the San Joaquin Division of **General Petroleum Company's** Production department at Taft, Calif. Nobile has been senior production foreman for General Petroleum's Santa Fe Springs operations since 1950. A native of Whittier, Calif., Nobile joined General Petroleum in 1921. He became a lease foreman at Santa Fe Springs in 1928 and production foreman at Wilmington in 1941.

•

Herbert H. Kelly, director of purchases for **Richfield Oil Corporation** since 1937, has retired under the company's retirement program. Kelly has been associated with Richfield and one of its predecessor companies, the **Rio Grande Oil Company,** for nearly 30 years. A native of England, Kelly came to the U. S. in 1920. He was associated with Bethlehem Steel Corporation and later was superintendent of engineering for the Pensacola Shipbuilding Company. He set up an aerial photography and mapping business in 1923, later joined Los Angeles Shipbuilding Company, and in 1926 joined Rio Grande Oil as assistant superintendent of the Vinvale refinery.

Herbert H. Kelly

•

Dr. Noyes D. Smith, director of **Shell Development Company's** exploration and production research laboratory in Houston, has been elected a vice president of the company. Smith joined Shell as a seismologist in 1935. During World War II he was on leave of absence with the Naval Ordnance Laboratory and upon his return to Shell in 1946, he was appointed manager of the laboratory's Physical department. He was made manager of the Administrative department and in 1951 became research manager of the Technical department. He was promoted to the directorship last year.

Standard Oil Company (New Jersey) has announced the appointment of **C. L. Burrill** as chief economist, a new position to coordinate economic studies for the board of directors. Since March 1 when he returned to Jersey after serving as vice president of Creole Petroleum Corporation, Burrill has been manager of the General Economic department. In addition, **J. A. Cogan,** head of the Coordination and Petroleum Economics department, has resigned to accept a position with **Imperial Oil Limited,** Jersey's Canadian affiliate. Succeeding Cogan will be **C. J. Hedlund. R. W. Adams,** who has been Burrill's assistant, was named as acting manager of the General Economics department.

C. L. Burrill

•

Dr. John C. Michaelson, formerly of the Department of Geology, Washington State College, Pullman, Wash., has joined **Sohio Petroleum Company** as staff geologist in their Lewistown office. **Walter Praetorius,** also of Washington State College, is engaged as a field assistant for the summer in the Wyoming area with headquarters at Casper.

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Harold H. Healy

Rolland W. McCanne

Harold H. Healy, manager of The Ohio Oil Company's Casper, Wyo. Production division since 1942, has retired and will be succeeded by Rolland W. McCanne, assistant division manager.

Healy joined Ohio Oil in 1934 as division attorney at Casper, and was appointed division manager in 1942. Following graduation from the University of Colorado, Boulder, in 1911, he studied law at Columbia University, receiving his LL.B. degree in 1914. Following the war, he practiced law in Denver for several years.

McCanne first worked for the company between school terms during the summer of 1928. His continuous employment started in 1930 as a geologist in the Casper division. He was advanced to division geologist at Casper in 1945. McCanne was moved to the company's general office, Findlay, as assistant to the manager of production. He returned to Casper as assistant manager of the Casper division.

•

C. W. Sanders has resigned as manager—operations for **Mendota Oil Company**. Sanders has opened an office in the Snowden Building, Fort Worth, to carry on his own operations and consulting practice.

•

H. Zinder & Associates, Inc., utility consultants of Washington and Dallas, announce the association of **Ionel I. Gardescu**, petroleum engineer and geologist, and the establishment of a Geological department in the Melrose Building in Houston.

•

William L. Fanning, Jr., has been appointed divisional supervisor of the crude and products section of **Tide Water Associated Oil Company's** Eastern division to succeed **Harold F. Parsons**, who retired after 37 years of service with the company.

•

Lawrence J. Beckmann has opened a consulting office in the Oil Capital Building in Tulsa. Beckmann was employed as a geologist with the Creole Petroleum Corporation in Venezuela. He returned to the States in 1944, being employed by The Carter Oil Company. He worked in Wyoming and Colorado from 1944 until 1948 at which time he was transferred to the Central division office in Oklahoma City. Beckmann resigned from The Carter Oil Company in 1952 to become division geologist for the **Union Oil Company** of California in Tulsa.

L. J. Beckmann

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This Cochrane Solids-Contact Reactor is used for lime softening well water by selective calcium precipitation for process purposes. Total dissolved solids, alkalinity and hardness are all reduced to well within process requirements.

Design of Cochrane Solids-Contact Reactors provide more completely treated water, faster, and at less cost than conventional methods of reaction and settling. High slurry strength in the reaction zone results in optimum catalytic effect; large sludge concentrators result in minimum waste water; automatic desludging saves time and labor; chemical savings are impressive.

For complete details of Cochrane Solids-Contact Reactors, write for Publication 5001-A and reprints on Reactors.

C100.11

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CORPORATION
3159 N. 17th Street, Philadelphia 32, Pa.

Representatives in thirty principal cities in U.S.; Toronto, Canada; Mexico City, Mexico; Paris, France; Havana, Cuba; Caracas, Venezuela; San Juan, Puerto Rico; Honolulu, Hawaii.

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Demineralizers • Hot Process Softeners • Hot Zeolite Softeners • Dealkalizers
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USE KINZBACH WHIPSTOCKS AND MILLS TO SIDETRACK YOUR HEADACHES

Type "A" Mill

Type "D" Mill

Type "H" Mill

Type "I" Mill

Kinzbach Whipstocks can be set at any depth and require no support for the bottom. Positive setting slips prevent slipping or turning in the hole. The Kinzbach hinge arrangement assures that the top of the Whipstock will be close against pipe wall at all times, permitting easy passage of drilling tools. Setting trigger always locates the Whipstock between couplings so that the window will be within one joint. Kinzbach Whipstocks are available in all popular casing sizes through your supply store.

Use Kinzbach Milling Tools for every whipstocking or metal cutting operation. They have high-speed tool steel inserts which are ground and set at the most efficient angle for fast, uniform cutting action. Shown at left are four popular models—see your Kinzbach Catalog for a description of the complete series of Milling Tools.

KINZBACH TOOL CO INC

KINZBACH TOOL CO., INC.

P. O. Box 277 Houston, Texas

Export Office: 74 Trinity Pl., New York, N. Y.

DEATHS

Albert J. Sherzer, independent oil operator of Tulsa, died June 25. A native of St. Louis, Mo., Sherzer entered the oil business in Wichita, Kansas, and moved to Tulsa about 1924. He owned oil producing properties in Kansas and Oklahoma.

•

W. Dale Russell, 64, vice president-general sales manager for Republic Supply Company of California, died June 11.

•

Walter W. Fleming, 68, retired vice president and director of The Ohio Oil Company, died May 28 in Tulsa. Fleming, who was manager of the Ohio's Tulsa division in charge of all Midcontinent operations when he retired in 1946, had been with Ohio 36 years.

•

W. S. (Bill) Evans, president and director of Lucey Export Corporation, New York, Buenos Aires, London and elsewhere, died May 30 in Englewood, N. J. Evans joined J. F. Lucey in 1908. He held many offices in the Lucey Co. and Lucey Manufacturing Corporation, transferring his activities to New York in 1913 to organize the Export Sales division for his company. In the late 1920's when Lucey Manufacturing became The Wheland Company, Evans created Lucey Export Corporation to handle foreign sales of Wheland Company and other oil equipment manufacturers.

•

Lowell W. Saunders, 53, chairman of the board of Intex Oil Company, Bakersfield, Calif., died June 20 in an automobile accident near Bakersfield. Saunders was one of the founders of the company.

•

Herbert John Reuwer, 58, production foreman for the Sun Oil Company, died June 22 in Quitman, Texas.

•

Robert F. (Bob) Hays, 57, independent oil operator of Kerrville and San Antonio, Texas, died June 9 in Kerrville. Hays started in the oil business with the Gypsy Oil Company and later formed the Harris-Hays Oil Company.

•

Arthur Vincent Hoenig, 76, Tulsa oilman, died June 16. A native of Titusville, Penn., Hoenig was first employed by Col. John J. Carter, founder of The Carter Oil Company. He later became vice president of the company's eastern division. After leaving Carter, Hoenig went with the old Indian Territory Illuminating Oil Company, becoming vice president of production.

•

James O. Lewis, 67, Houston petroleum consultant and former Tulsan, died June 15. Lewis moved from Tulsa to Houston about 14 years ago. He was a partner in the Tulsa firm of Dunn and Lewis, petroleum consultants. Lewis was former chief of the Bartlesville station of the U. S. Bureau of Mines Petroleum Division and a former chief petroleum technologist and engineer with the bureau in Washington, D. C.

•

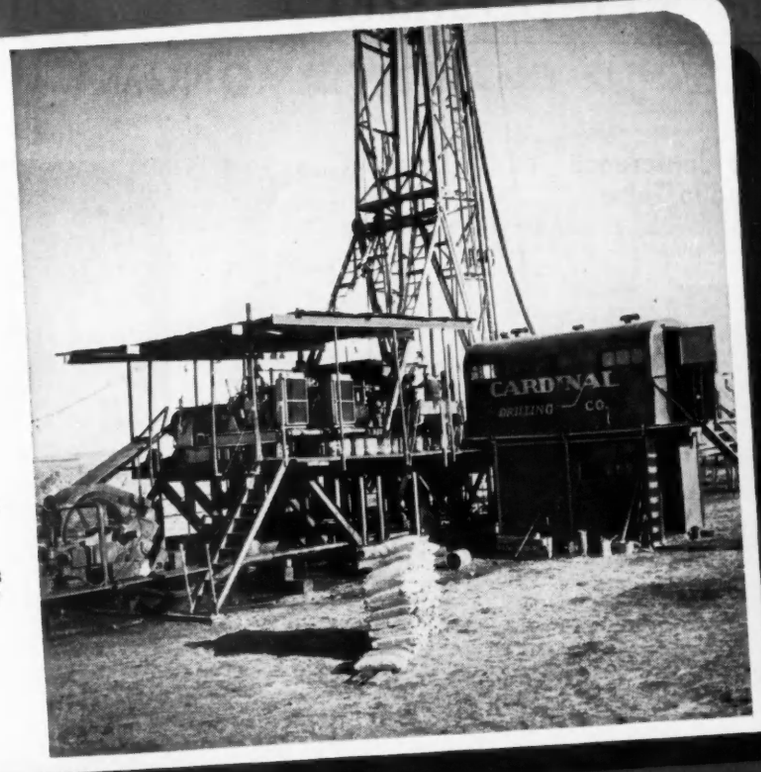
Harry Hines, 67, Dallas oil operator, died May 28. He started in the oil business in 1916 in Oklahoma and later expanded operations into Texas, Arkansas, Louisiana, Mississippi and Alabama. At one time he was in Wichita Falls, Texas, where he operated as Knight and Hines and Consolidated Oil Company.

GM DIESEL
CASE HISTORY No. 538-1Y

USER: Cardinal Drilling Company, Bismarck, N. D.

INSTALLATION: Two GM "Twin 6-71" Diesels replaced four gas engines in February 1953, driving PBM 36 Emsco drilling rig and mud pump.

PERFORMANCE: Drilling Superintendent Charles Spaulding reports he's cut fuel costs 49%, cut maintenance costs 25% and boosted production 25% since he switched from butane to GM Diesel power. GM Diesels also eliminated the problem of fuel freezing in the lines when drilling in 30° - 40° below zero weather.



It Pays to STANDARDIZE on

GM
GENERAL MOTORS
DIESEL POWER

Drills Faster—Cut Fuel Costs 49%

Since He Switched from BUTANE to General Motors Diesel

Here's a new General Motors Diesel economy story: Although butane cost this drilling contractor about 5¢ less per gallon than Diesel fuel, he switched from an LP gas engine to General Motors 2-cycle Diesel power—*and cut fuel costs 49%!*

GM Diesels cut fuel consumption by 335 gallons per 24-hour day—boosted production 25%. Because GM Diesels are built for this kind of work, his maintenance costs dropped 25% in the first 8 months. He is also no longer bothered with fuel freezing in the lines.

Producing more power from smaller, lighter Diesel units, quick-starting GM 2-cycle Diesels let drillers make faster moves without special road permits. GM Diesel distributors back up engine performance with fast service and quick delivery of low-cost parts. As Drilling Superintendent Charles Spaulding says, "I'm usually drilling in pretty isolated territory but no matter where I drill, I'm close to GM Diesel service." For more information see your GM Diesel distributor or write:

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GENERAL MOTORS • DETROIT 28, MICHIGAN
Single Engines...30 to 300 H.P. Multiple Units...Up to 893 H.P.

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Los Angeles
ANDERSON-O'BRIEN CO.
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ILLINOIS—Mt. Carmel
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WESTERN MACHINERY & ENGINE CO.

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HARRY CORNELIUS CO.

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SWEENEY BROTHERS

OKLAHOMA—Oklahoma City
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TEXAS—Corpus Christi—Dallas—Houston—Lubbock—Odessa—San Juan
STEWART & STEVENSON SERVICES, INC.
Plainview
DIESEL POWER, INC.

UTAH—Salt Lake City
CATE EQUIPMENT CO., INC.

What's Happening

AMONG INDUSTRY ASSOCIATIONS

Electrical Conference To Be Held in Tulsa

The first Electrical Conference of the Petroleum Industry with a program featuring engineers, scientists, and technicians will take place in Tulsa September 27-29. The three-day technical conference is being held under the sponsorship of the Petroleum Industry Committee of the American Institute of Electrical Engineers with the Tulsa section as host.

A. C. Monteith

The purpose of the meeting is to provide an interchange of electrical technology through an industry-wide coverage of applications in oil and gas production, refining, transportation and allied petrochemical fields. A. C. Monteith, president of the AIEE and vice president—engineering for Westinghouse Electric Corporation, will be the main guest speaker at a banquet September 28.

Rocky Mountain Geologists Plan Field Conference

The Rocky Mountain Association of Geologists has announced October 13, 14 and 15 as the dates of its annual field trip and conference.

The trip, to cover the area from Denver to Canon City with local trips in the Canon City area, will be made by observation type bus. It will originate at the Seventeenth and Glenarm Bus Terminal in Denver.

A feature of the trip will be an address at Florence, Colo. on the last day of the trip commemorating the discovery of the Florence field, Colorado's first and the nation's second commercial field.

A technical program will be held in Canon City on October 14. Speakers will include John C. Maher, U.S.G.S., Tulsa; R. T. Widney, Cities Service Oil Company; G. R. Downs, Denver consulting geologist; and a lecture on Colorado's radioactive minerals by an Atomic Energy Commission geologist.

Details may be obtained from T. C. Hiestand, 310 Continental Oil Building, Denver 2.

Geological Societies Plan Annual Gulf Coast Meeting

The Gulf Coast Association of Geological Societies will hold its fourth annual meeting November 3-5 at the Rice Hotel, Houston.

Member societies who will be represented include the Baton Rouge, Corpus Christi, East Texas, Houston, Mississippi, New Orleans, Shreveport, South Louisiana, Lafayette, South Texas and Southeastern Geological societies.

C. E. Buchner

I. C. Huff, Jr.

Huff Succeeds Buchner As IPAA Executive Manager

C. E. Buchner has retired from his duties as executive manager of the Independent Petroleum Association of America. I. C. (Cleve) Huff, Jr., assistant executive manager of the national oil trade association, will succeed Buchner as administrator of the operations of IPAA's headquarters in Tulsa.

Buchner will continue to serve the association in a consultive capacity. Buchner joined IPAA as executive manager in 1931. As Buchner's successor, Huff brings to the post 13 years of experience in association activities. He joined IPAA as a field representative in Tulsa in 1941 and later served as district representative in Houston. Huff returned to Tulsa as IPAA membership director in 1950 and was named assistant executive manager in 1952.

Grant Elected President Of Oil Producers Agency

Richard A. Grant, vice president, general counsel and a director of Fullerton Oil Company, was re-elected president of Oil Producers Agency of California recentlv. R. R. Von Hagen, president of the Lloyd Corporation, was elected a vice president and H. D. Campbell, president of Franco Western Oil Company, and W. H. Geis, consultant, were re-elected vice presidents.

S. E. Cavanaugh, vice president of Pacific Western Oil Corporation, was named secretary-treasurer and Verne Harrell, vice president of Bankline Oil Company, was re-elected assistant secretary and treasurer. Stark Fox, executive vice president, was also re-elected.

Abilene AAODC Chapter Names Gilchrist Head

A new chapter of the American Association of Oilwell Drilling Contractors has been formed at Abilene, Texas. Fifty contractors and representatives were present at the organizational meeting and B. F. Gilchrist, Gilchrist Drilling Company, Abilene, was named chairman.

Other officers are George M. Straughan, Lauderdale & Straughan Drilling Company, Abilene, vice chairman; and George D. Hunter, General Geophysical Company, Abilene, secretary-treasurer.

Exploration Geophysicists Plan Meeting in Dallas

The eighth annual Midwestern meeting of the Society of Exploration Geophysicists will be held November 18 and 19 at the Adolphus Hotel in Dallas.

R. C. Dunlap, Jr., general chairman, vice president of Geophysical Service, Inc., Dallas, said registration will begin November 17 for more than 1000 exploration scientists from Texas, Louisiana, Oklahoma, and New Mexico. Meeting committees are headed by members of the Dallas Geophysical Society who are assisted by members of five other participating SEG local sections in Fort Worth, Midland, Shreveport, Oklahoma City, and Tulsa.

Committee chairman appointed by Dunlap include John T. Geer, Magnolia Petroleum Company, housing; Martin C. Kelsey, Rayflex Exploration Company, finance; L. L. Logue, Exploration Surveys, Inc., entertainment; John W. Wilson, Geophysical Service, Inc., program publication; R. Maurice Tripp, Research, Inc., program; Howard L. Cobb, The Atlantic Refining Company, registration; Chester J. Donnally, Donnally Geophysical Company, arrangements, and John A. Lester, Magnolia Petroleum Company, publicity.

Regional Chapter of AAODC Organized in Louisiana

The American Association of Oilwell Drilling Contractors has organized a regional chapter in Lafayette, La., the sixteenth section now functioning in various drilling areas of the U.S.

Officers for the South Louisiana chapter are W. A. Grapes, Falcon Seaboard Drilling Company, chairman; W. C. Fatjo, W. C. Fatjo Drilling Company, vice chairman, and Drew Cornell, secretary-treasurer, all of Lafayette.

Houston Geological Society Names Jack Colle President

Jack Colle, consultant, has been named to head the Houston Geological Society for 1954-1955. Other officers are Hillord Hinson, consultant, first vice president; Ben A. Elmdahl, Core Laboratories, Inc., second vice president; Walter W. McMahan, Jr., Magnolia Petroleum Company, secretary; Judd H. Oualline, Skelly Oil Company, treasurer.

The advisory committee is composed of Thomas D. Barber, Stanolind Oil and Gas Company; W. A. Clark, Jr., independent; and Roy A. Payne, Gulf Oil Corporation.

AIME Petroleum Branch To Meet October 18-20

Fifty technical papers will be presented at the fall meeting of the Petroleum Branch, American Institute of Mining and Metallurgical Engineers in San Antonio, Texas, October 18-20. Three concurrent technical sessions will be held each morning and two concurrent meetings in the afternoons. A registration of 2200 men and 400 women is expected.

What's Happening

AMONG SERVICE AND SUPPLY MEN

Cameron Iron Works Expands Operations with Aviation Division

Cameron Iron Works, Inc., has expanded its operations by adding a division to serve America's aviation industry, resulting in the development of Camair, located at the Municipal Airport, Galveston, Texas.

Camair will render service to both commercial and military needs of America's aviation from Galveston, featuring overhaul, repair, modification, maintenance and conversion of aircraft; the production of aircraft parts, assemblies, tools, dies, jigs and fixtures with aircraft quality steel forgings a specialty. Camair also presents the Camair 480, a superior twin engine conversion of the Ryan Navion, designed for the flying executive.

Major departments of Camair will be research and development, fabrication, service and sales.

Camco Plans Construction Of New Plant in Houston

Construction plans have been announced for the new $200,000 home office and plant for Camco, Inc. in Houston. Camco manufactures and distributes gas lift equipment used in the secondary recovery of oil.

The office building will include facilities for general and engineering offices. Paul R. Mills is chairman of the board of Camco and E. K. Watters is president—general manager.

Lane-Wells Office Opens in Bartlesville

Lane-Wells Company is opening a new branch in Bartlesville, Okla., at 1701 West Fifth Street.

Robert D. Johnson, formerly gun perforator operator at Perry, Okla., is in charge of the new location. Johnson is a veteran in oil field service, having been with Lane-Wells since 1945.

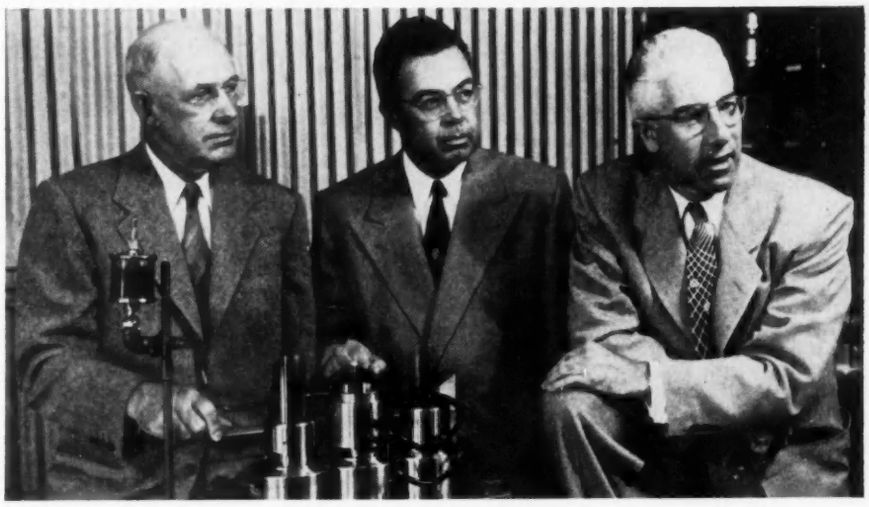
Kenneth W. Simmons, formerly radioactivity operator at Oklahoma City is district sales engineer. Charles A. Berquist and Fred A. Soule, all experienced Lane-Wells personnel, come with Johnson to staff the new branch.

New Lone Star Steel Plant Makes Oil Field Tubular Goods

Lone Star Steel Company has opened its Germany plant at Daingerfield, Texas, where Lone Star recently has started turning out tubular goods for the oil industry at the steel plant.

Lone Star will annually manufacture about 400,000 tons of steel pipe at the plant.

At recent ceremonies showing the plant to 300 oilmen of the Southwest, a pre-Civil war blast furnace which had been restored at the entrance to Lone Star's plant was unveiled. A plaque on the furnace pays tribute to members of the Texas Railroad Commission.



Original Founders Buy Kobe, Inc.

Kobe, Inc., newly organized by the founders of the original company of the same name, has purchased the business and facilities of the Kobe Division of Dresser Equipment Company. Officers of the new Kobe are, left to right, C. J. Coberly, president; James C. Coberly, Jr., vice president and general manager; and Harry C. Gunetti, vice president for manufacturing.

Oil Well Supply Announces Appointment of Representatives

U. S. Steel's Oil Well Supply division has announced the appointment of several field representatives in various parts of Texas.

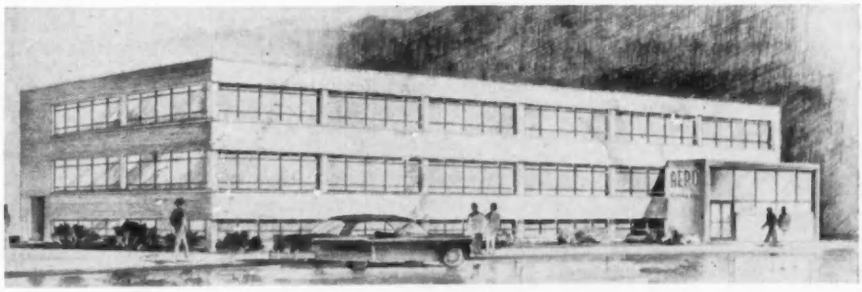
Harold C. Nicholson has been named city representative at Houston; Loyd D. Huckaby, field representative at Houston; James J. Shope, manager of the Borger store; Milton A. Grappe, field representative at Borger; Charles E. Craft, field representative at Wichita Falls; Ben F. Mayo, field representative at Kilgore; Gerrett A. Klatt, Jr., and John E. Bergmann, field representatives at Victoria; Kelly Joe Proctor, field representative at Monahans; and Doyle L. Allison, field representative at Albany.

Appointments in other states were that of Alvin L. Wooden as field representative at Fort Morgan, Colo.; and John K. Fifer, manager of the Harvey, La., store; Herbert R. Trantham, Jr., manager of the company's store at Eunice, La.; and Holland A. Hatcher, field representative at Arkansas City, Kansas.

Archambault Named President Of Stewart-Warner Corporation

Bennett Archambault has been elected president and director of Stewart-Warner Corporation. James S. Knowlson, chairman of the board, announced Archambault's selection after a board meeting at which Knowlson was reelected chairman and other incumbent officers of the corporation were reelected.

The new president has been vice president and general manager of the M. W. Kellogg Company. He has been with the Kellogg Company nine years.



World's Oldest Flying Corporation Expands

Construction is under way on a new administration building for Aero Service Corporation, Philadelphia. The new building will provide approximately 19,000 square feet of working space. Cost of the structure is to be about $295,000 and completion is scheduled for October, 1954.

Herb J. Hawthorne, Inc. Has Sales Meeting

Employes attending the recent sales meeting of Herb J. Hawthorne, Inc., in Billings, Mont., were, left to right seated, Gordon Goodwin, Seismic Service Supply, Calgary, Canada; Mrs. Lena Woolf, Seismic Service Supply, Edmonton, Canada; Mr. and Mrs. Roy Green, Chuck's Welding Shop, Casper, Wyo.; Mr. and Mrs. Herb J. Hawthorne, Herb J. Hawthorne, Inc., Houston; Mr. and Mrs. R. C. Nelson, Bismarck Powder Company, Bismarck, N. D.; Mr. and Mrs. W. Garceau, Basin Oilfield Supply Company, Wolf Point, Mont.

Standing, left to right are, Ken Ross, Seismic Service Supply, Edmonton, Canada; Cary Gunn and Mr. and Mrs. Al Harding, Seismic Service Supply, Calgary, Canada; C. Max Fountain, Herb J. Hawthorne, Inc., Denver, Colo.; L. E. Seikmeyer, Colorado Pump & Supply Company, Denver, Colo.; Earl M. Weaver and P. A. McMurdy, Herb J. Hawthorne, Inc., Houston; Lew Ladwig, Mayhew Supply Company, Inc., Sidney, Mont.; Ray Medlock, Mayhew Supply Company, Casper, Wyo., and Charles T. Baker, Herb J. Hawthorne, Inc., Sidney, Mont., and Oklahoma City, Okla.

McCullough Tool Company Appoints Gray Assistant Vice President

McCullough Tool Company has announced the appointment of James M. Gray as assistant vice president. Gray will remain in Houston where he will assist in the administration of the Eastern division of the company which is under the direction of O. J. McCullough, vice president.

James M. Gray

For ten years prior to joining McCullough Tool Company in 1939 as Eastern division credit manager, Gray was associated with the National City Bank in New York City in the Credits and New Business departments. Previous to that he had been with the Boone County National Bank at Columbia, Mo., and First Trust and Savings Bank, Miami, Fla.

In 1950, Gray was appointed assistant secretary-treasurer of McCullough Tool Company and in 1952 became a member of the McCullough advisory committee, profit sharing and stock ownership plan.

Ray Graves Receives Promotion With Universal Atlas Cement

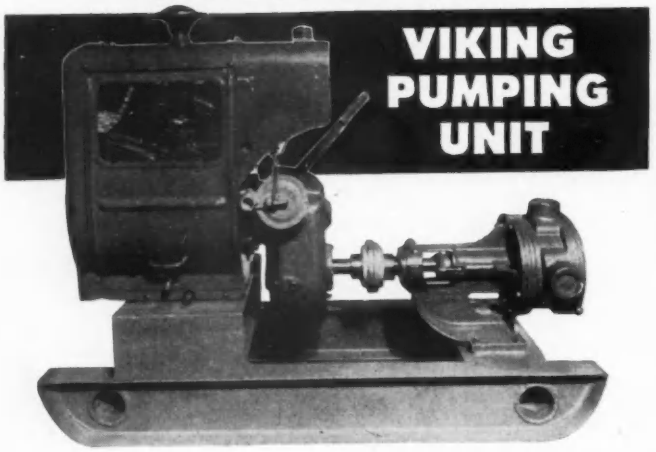
Ray Graves has been appointed assistant to general operating manager, New York, of Universal Atlas Cement Company, a subsidiary of United States Steel Corporation.

Graves joined Universal Atlas Cement Company as a store clerk at the Company's Leeds, Ala., plant in 1926. He was transferred to the Waco, Texas, plant in October 1928 while it was still under construction. The following year he was appointed storekeeper at the Waco plant and in 1945 became plant engineer which position he has held until his present appointment.

McKissick Products Appoints Export Representative

McKissick Products Corporation has announced the appointment of D. T. O'Connor as export representative. He will handle all export business with the exception of Canada. All other matters will continue to be handled by the Tulsa office.

Another Efficient



Viking pumps are giving top performance wherever used in the pipe-line industry. The above installation is serving a major pipeline company and consists of: a Viking Model L-124, Size 2" Standard fitted heavy duty rotary pump mounted on welded steel skids and direct connected through 7 F Falk coupling to a 2 cylinder Air Cooled Power Unit.

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AUTO-RELEASE WIRE LINE STRIPPER

Finest in the field. King Strippers represent outstanding advances in design and construction that assure long life and maximum operating efficiency:

- POSITIVE LATCH will not release by accident or surge of pressure.
- SURE RELEASE MECHANISM operated by rope socket striking bottom of the stripper.
- NON-SPARKING MATERIALS minimize fire hazard.
- ROLLER WIRE LINE GUIDES on hardened steel pins.
- SIDE OPENINGS for inserting packing while line is in the hole.
- PACKING IS SELF-CENTERING; compression screws need not be evenly adjusted.

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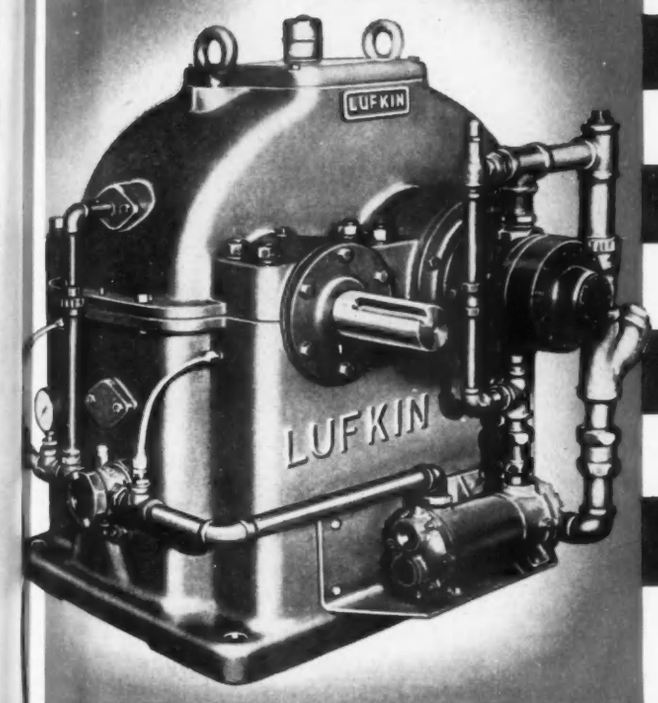
Lufkin HERRINGBONE GEAR SPEED REDUCERS AND INCREASERS



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ANY SIZE

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ANY RATIO

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WHERE SPEED IS REDUCED OR INCREASED . . . . . .

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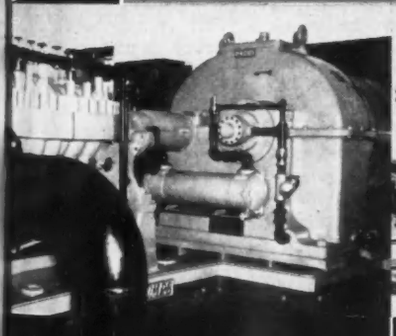
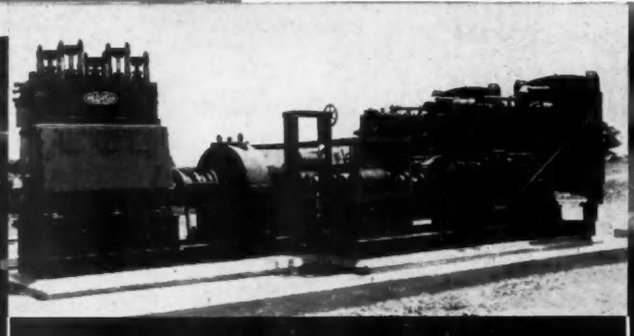
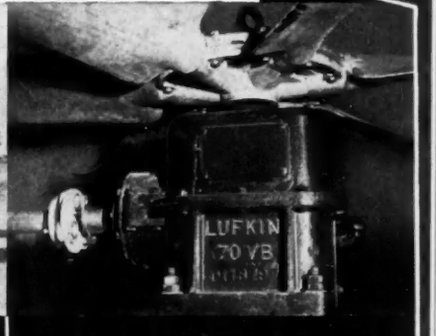


PIPELINE PUMP



SALT WATER DISPOSAL



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Lufkin Equipment in CANADA is handled by
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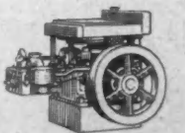
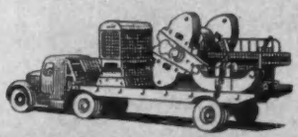


LUFKIN-COOPER-BESSEMER ENGINES



LUFKIN OIL FIELD AND INDUSTRIAL TRUCK TRAILERS

INDUSTRIAL SPEED REDUCERS AND INCREASERS

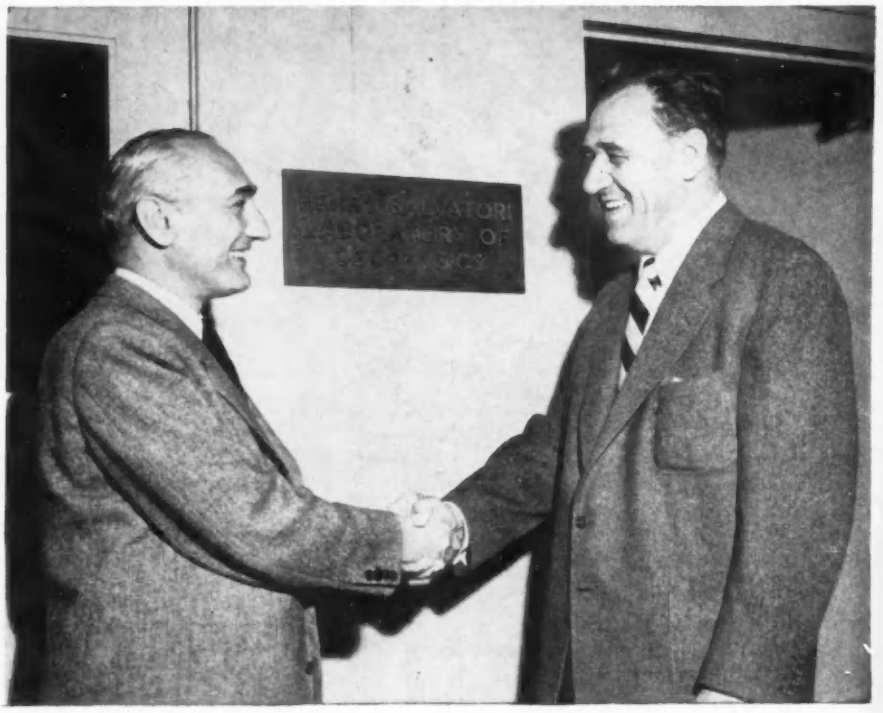
DIVISION LUFKIN FOUNDRY & MACHINE COMPANY INDUSTRIAL, MILL AND AUTOMOTIVE SUPPLIES

E. L. DeGolyer Elected To Dresser Industries Board

E. L. DeGolyer, petroleum geologist and oil executive, has been elected to the board of directors of Dresser Industries, Inc. DeGolyer is a senior member of the consulting firm of DeGolyer & McNaughton, Dallas. He is a director of the First National Bank of Dallas, the Louisiana Land and Exploration Company, Republic Natural Gas Company, Texas Eastern Transmission Corporation, Southern Pacific Company, Great Plains Development Company and is chairman of the Saturday Review of Literature.

E. L. DeGolyer

Other members of Dresser's board are Norman Chandler, president and publisher, Los Angeles Times; C. Paul Clark, Olean, N.Y.; William V. Griffin, chairman, Brady Security and Realty Corp., New York; Henry P. Isham, president, Clearing Industrial District, Inc., Chicago; Willard M. Johnson, president, Magnet Cove Barium Corp., Houston; H. N. Mallon, president, Dresser Industries; William A. McAfee, McAfee, Grossman, Taplin, Hanning, Newcomer & Hazlett, Cleveland, Ohio; J. B. O'Connor, executive vice president, Dresser Industries; Tom Slick, partner, Slick-Moorman Oil Company, San Antonio, Texas, and Arthur R. Weis, president, Pacific Pumps, Inc., Huntington Park, Calif.



New Laboratory Dedicated

Wallace Sterling, right, president of Stanford University, extends thanks to Henry Salvatori, head of Western Geophysical Company of Los Angeles, at the recent dedication of a $60,000 laboratory for the study of geophysical techniques of exploration for oil and minerals at Stanford. Salvatori and the company are donors of the building, as well as a fully-equipped reflection seismograph truck. Other equipment gifts for the new laboratory came from Shell Oil Company, Stanolind Oil and Gas Company, and Humble Oil and Refining Companies.

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Rector Well Equipment Company Names Foreign Sales Representative

The Continental Supply Company, The Mid-Continent Supply Company, and The Oil Well Supply Division of United States Steel Corporation have been appointed foreign sales representatives for all Rector Equipment Company, Inc., products.

Under the terms of this arrangement, all three companies will serve as exclusive representatives for Rector casing and tubing heads, cementing equipment, floating equipment, christmas trees and Rectorseal to the oil industry for all countries except the U. S. and Canada.

This arrangement in no way affects the sale and distribution of Rector products in the U. S. and Canada, which are now sold by authorized supply stores in these two countries, including the three newly appointed foreign representative companies.

This is reported to be the first time that a foreign sales and distribution program of this nature has been worked out between a manufacturer and three supply companies. This plan, originated by L. L. Rector, president of the company, is designed to provide better service for foreign operators through closer contact with American equipment manufacturers and quicker deliveries on equipment ordered from them.

Ingles Is Named Superintendent Of Colorado Fuel's New Mine

Lloyd W. Ingles was recently named superintendent of Colorado Fuel and Iron Corporation's new Allen mine at Weston, Colo. Ingles succeeded H. D. Pinkney who resigned.

Ringle Named Sales Manager For Grant Oil Tool Company

Grant Oil Tool Company, Los Angeles, has announced the appointment of Robert E. Ringle as sales manager for Grant and its subsidiary, MacClatchie Manufacturing Company, Compton, Calif. Ringle has recently returned from an extended trip to all service branches of the company in the Mid-Continent and Gulf Coast areas.

Robert E. Ringle

Ringle, who started as a salesman and later became a machine operator in a manufacturing company, has an extensive background in industrial sales and management. His experience includes proprietorship of two industrial concerns, and management activities in a large rubber company and a leading tool manufacturer. Ringle will make his headquarters in Los Angeles.

Canadian Aero Service Names Sales Manager

James Harold (Red) Lymburner, well known aviation executive, has been named sales manager of Canadian Aero Service, Limited, Ottawa.

Lymburner brings a broad background of flying and sales experience to his new post. He has flown over many remote areas in Canada, and he was chief test pilot for the two Ellsworth expeditions to the Antarctic in the thirties. During World War II he was chief test pilot for Fairchild Aircraft, Limited, and he holds an honorary Group Captaincy, R.C.A.F.

Lymburner will direct the sales effort of Canadian Aero Service Limited, which is engaged in airborne magnetometer surveys for oil and minerals, scintillation counter surveys, and aerial topographic mapping. The company is affiliated with Spartan Air Services Limited, Ottawa.

Chicago Pneumatic Tool Opens New District Office

The Chicago Pneumatic Tool Company has opened a new district office and warehouse at Alice, Texas. The office will be under the supervision of E. K. Giggy, district manager and T. J. Dacy will assist him.

Prior to his appointment, Giggy represented the Chicago Pneumatic Tool Company in the Kermit, Texas, area for nine years. He acquired his early field experience as a driller in Kansas, Louisiana and West Texas.

Hale Named to Executive Post With South Chester Tube Company

W. C. Hale, Jr. has been elected executive vice president of South Chester Tube Company, Chester, Penn., and its subsidiaries, South Chester Corporation, Chester, Penn., and Chester Tidewater Terminal, Chester, Penn.

Hale has served several years as vice president-general manager of South Chester Corporation. He served formerly in various capacities with the South Chester Tube Company, where during World War II he was responsible for production of ordnance material for the U. S. Navy. Prior to joining the South Chester group, Hale was employed by Gulf Oil Company.

Plant Nears Completion

The National Supply Company's $3,700,000 plant being built at Gainesville, Texas, is nearing completion. Scheduled for completion in 1954, this plant will be the company's seventh. The plant is located on a 96-acre site in northeast Texas.

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LINE PIPE COUPLINGS A.P.I.
1/8" to 12"—Seamless and Special Processed—Black or Galvanized
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3/4" to 3 1/2"—Seamless
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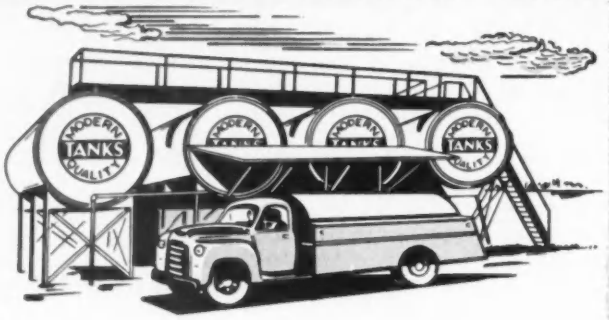
3/8" to 12"—Seamless or Special Processed
Sales Offices in Leading Cities
Albany, N. Y.—Albert L. Becker, 434 Clinton Ave.
Baltimore, Md.—Ted Barto, 2301 N. Charles St.
Chicago, Ill.—Harry A. Jay, Suite 1090, Old Colony Bldg.
Denver, Colo.—Earl H. Jones & Co., 1863 Wazee St.
Detroit, Mich.—Thomas L. Osberger, 10226 Woodward Ave.
Erie, Pa.—R. J. Maggi, Box 711
Falmouth, Mass.—Walter S. Bennett, 53 Minot St.
Houston, Tex.—Henry H. Paris Distributor, Inc., Box 932
Los Angeles, Cal.—James A. Riordan Co., 1400 Santa Fe Ave.
Minneapolis, Minn.—Lin J. Krause, 5605 Lyndale Ave. S.
Narberth, Pa.—J. W. Worthington, 105 Forrest Ave.
New York, N. Y.—Henry Stein, 50 Cliff St.
Portland, Ore.—Earl H. Jones & Co., 1233 NW 12th Ave.
Richmond, Va.—P. C. Abbott & Co., 15 E. Franklin St.
St. Louis, Mo.—Mike A. Boyle, 5628 Gravois Ave.
San Francisco, Cal.—Earl H. Jones & Co., 1150 Folsom St.
Seattle, Wash.—Earl H. Jones & Co., 819 Thomas St.
Summit, N. J.—Ira L. Rothenberg & Assocs., P. O. Box 475
WHEELING MACHINE PRODUCTS COMPANY
WHEELING, WEST VIRGINIA
Factories at WHEELING, W. VA. and WOODLAKE, CALIFORNIA

The MODERN Line



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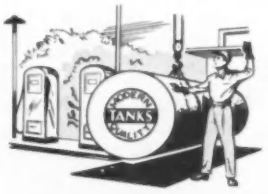
The MODERN line—your *direct* line to quality storage service! Coast to coast more MODERN QUALITY steel storage tanks are specified because there are units for every type of storage operation—units approved by the Underwriters Laboratories. Today more and more petroleum distributors get MODERN QUALITY storage tanks for their products, proving that it makes sense to join the hundreds of satisfied customers who order and re-order MODERN QUALITY tanks. There's a type and size to fit every storage problem—yours, *too!* Phone us today!

Go MODERN at *your* plant! Guaranteed one year against defective materials or workmanship.



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MODERN QUALITY VERTICAL BULK STORAGE TANKS—scientifically designed and double butt-welded to meet and surpass Underwriters specifications. Flat or cone tops available.

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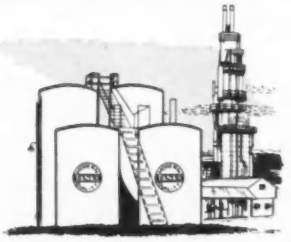

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I. M. Baker

R. C. Brooks

Cameron Iron Works Announces Several Personnel Changes

Cameron Iron Works, Valve and Oil Tool Division, has announced the appointment of I. M. (Squirt) Baker as division sales manager for Mexico and South America. Baker was formerly division sales manager of the Houston division. His headquarters will continue to be in the Houston office of the company.

G. L. Teer

R. C. Brooks is now division sales manager for Cameron's Houston Division. G. L. Teer, who until recently was division sales manager of the West Texas division, has been transferred to Calgary, Alberta, Canada, as division sales manager, Cameron Iron Works of Canada, Ltd. Teer was replaced by T. G. Roscoe as Cameron's district sales manager in charge of the West Texas division.

Lawrence L. Bott Joins National Aluminate Corporation

Dr. Lawrence L. Bott has joined the technical staff of the National Aluminate Corporation and has been placed in charge of the Oil Treatment Laboratory.

Lawrence L. Bott

Dr. Bott, a graduate of the University of Illinois and Rice Institute, has been associated with Armour and Company and Ekco Products. He resides in Chicago.

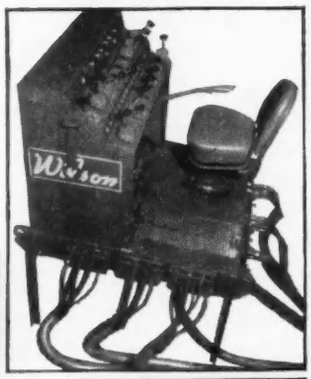
Cajthaml Becomes Store Manager For Continental Supply Company

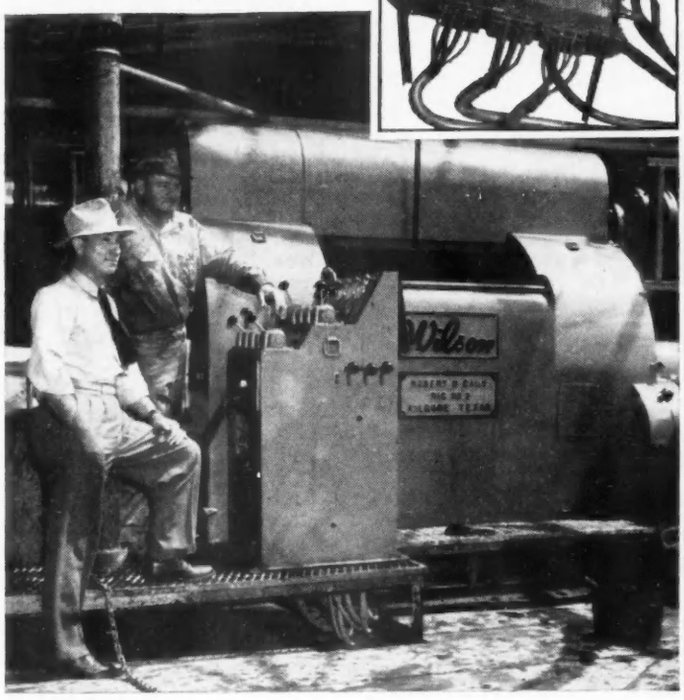
The Continental Supply Company has announced the promotion of Godfrey Cajthaml, former field salesman at Williston, N. D. to store manager at Glendive, Mont. B. J. Veach, store manager in Glendive, becomes field salesman at Williston.

Wade Farrar, Jr. moved from field salesman at Duncan, Okla. to store manager at Healdton, Okla., replacing Doyle H. Cavins, who is field salesman at Healdton.

WESTINGHOUSE
Pneumatic Controls

speed operation with remote control panel





• Mobility and ease of operation are the two outstanding features of Wilson Manufacturing Company's line of remote control drilling rigs. Every operation is controlled with a pneumatic system designed and built by Westinghouse Air Brake Company. Flexible air hoses are the only linkages from the control panel to the rig itself. As a result, the panel can be moved easily to the most convenient location for the driller, and it can be moved from rig to rig if desired.

Easy, fingertip operation of the Westinghouse Controls helps speed the drilling operations and cuts drilling costs. Westinghouse Pneumatic Systems have helped many remote control rigs set high speed drilling records.

Write for more information about the advantages of Westinghouse Pneumatic Controls.

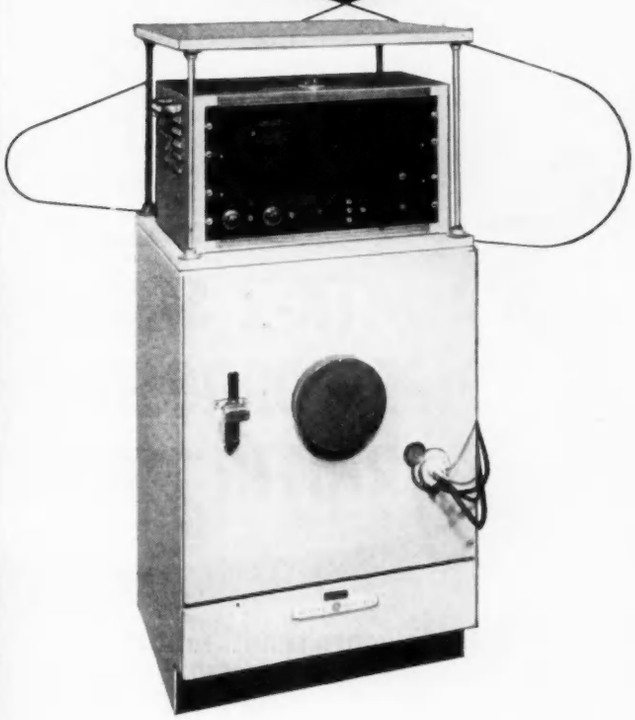
Westinghouse Air Brake
COMPANY

INDUSTRIAL PRODUCTS DIVISION WILMERDING, PENNA.

Factory Branch: Emeryville, Calif. Distributors throughout the United States . . . Consult your Classified Directory. Distributed in Canada by: Canadian Westinghouse Co. Ltd., Hamilton, Ont.

Manufacturers of pneumatic cylinders, actuators, air control devices of all kinds and engineered pneumatic control systems.

LIQUID SCINTILLATION DETECTOR



Tracerlab's unique CE-1 Liquid Scintillation Detector is designed primarily for counting samples of low energy beta emitters such as C-14 and Tritium, which can be prepared in liquid form. Efficiencies of approximately 75% for C-14 and 20 to 25% for Tritium can be obtained with this unit. The total sample volume is 50 cc and sample preparation is extremely simple.

An extremely low background of only 200 to 250 CPM is obtained by refrigeration of the phototubes, use of a dual-channel coincidence amplifier which passes only pulses which occur at the same time, and an overpulse rejection circuit. The two photomultiplier tubes with preamplifiers and a scintillation cell are mounted inside a lead shield in a small refrigerator. Samples may be stored in the dark before counting and a glove port permits transferring samples without exposure to light.

Booklet TL 59 contains complete details and will be sent upon request.

Tracerlab INC
130 HIGH ST., BOSTON
2030 WRIGHT AVE., RICHMOND, CAL

Moran Named Products Manager For U.S. Rubber Company

H. Leon Moran has been appointed new products manager for the mechanical goods division, United States Rubber Company. Moran will be responsible for speeding the adoption and commercialization of new products.

Moran was formerly factory manager of the division's Fort Wayne plant. His career in the rubber industry began as a laboratory assistant in 1922. He was selected for executive training the following year. In 1932 he was made a production manager and two years later a division superintendent. Moran became superintendent of a major division in 1945 and general superintendent later in the year. He became factory manager of the Fort Wayne plant in 1947. Moran will continue to make his headquarters in Fort Wayne.

Keith Davis Elected Controller Of Black, Sivalls & Bryson

Keith E. Davis has been elected controller of Black, Sivalls & Bryson, Inc. Davis will be responsible for all the accounting activities of Black, Sivalls & Bryson, Inc., and its subsidiary companies, Black, Sivalls & Bryson, Ltd., and Zenite Metal Corporation. He will headquarter at the Kansas City general offices.

Keith E. Davis

Joining Black, Sivalls & Bryson in February, 1951, Davis has been assistant controller since that time, and has been acting controller of the company since April, 1954. Previously, Davis had been associated with Ernst & Ernst as senior accountant for 3½ years, in Chicago. He is a graduate of the University of Iowa where he obtained his masters degree in commerce.

William Delaney to Represent Oil Center Tool Company

Oil Center Tool Company has announced the appointment of William Delaney as a sales representative in the Oklahoma City area.

William Delaney

Delaney, a native of Dublin, Ireland, came to the United States in 1947. After several years general experience in drilling and producing in the oil fields, he joined O-C-T as a service man and sales representative in 1951. He worked in the East Texas, North Louisiana and West Texas areas. He resigned from O-C-T in August, 1953, to form his own business and returned to the company in his present position in July of this year.

Bowen to Serve Martin-Decker As Foreign Representative

P. M. (Shorty) Bowen has been appointed to the newly-created position of foreign representative of Martin-Decker Corporation. Bowen's duties consist of aiding visitors and demonstrating the varied uses of Martin-Decker equipment. He also assists American oilmen leaving for foreign assignments.

P. M. (Shorty) Bowen

Bowen has spent 33 years in the oil business as a driller, wellshooter and tool pusher. Twenty-one of these years were spent in South America. He has thorough knowledge of drilling installations over the world and is active in the Nomads.

Bowen conducts visitors on tours through the modern Martin-Decker, Long Beach, Calif., plant and brings them up to date on the latest drilling-control instruments and techniques. When not acting as foreign representative, he calls on domestic drilling installations to instruct drillers in the applications of the Martin-Decker instruments.

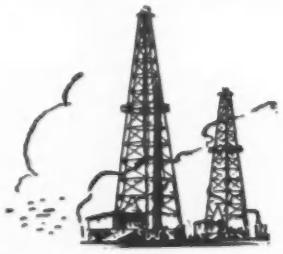
A. C. Oden Becomes Partner In Texas Tool and Machine

A. C. Oden has become a partner and vice president of Texas Tool and Machine Company in Houston. William G. Baker is owner of the firm.

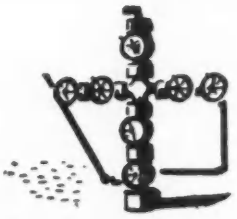
Oden has completed 10 years of service with McEvoy Company as sales engineer. Oden has had considerable experience in the oil fields and has made nine trips to South America.

TK-2 SOLVES PIPE CORROSION AND PARAFFIN PROBLEMS

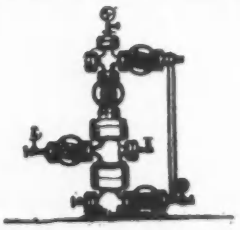
Here's why more than 7 million feet of pipe now in service are lined with TK-2 thermosetting plastic.



DRILL PIPE — Uncoated steel pipe used in a West Texas field failed because of corrosion after drilling only 5,000 feet. Drill pipe lined with TK-2 and used in same field has drilled to 70,000 feet without failure.



HIGH PRESSURE OIL WELLS—In wells where excessive carbon dioxide has been encountered, uncoated pipe has failed because of corrosion in 10 to 18 months. Pipe lined with TK-2 used in same wells showed no signs of corrosion even after 28 months.



GAS LIFT WELLS — Uncoated pipe installed in one field in 1949 failed because of corrosion after 2 years. Pipe lined with TK-2 used in same field is still in good condition after 5 years!

TK-2 is Tube-Kote's specially formulated plastic that is thermobonded to the interior surface of pipe, casing, tubing and other tubular items. It prevents corrosion, resists paraffin deposition — saves shutdown time and replacement costs!

Write for free data booklet.

TUBE-KOTE INC.
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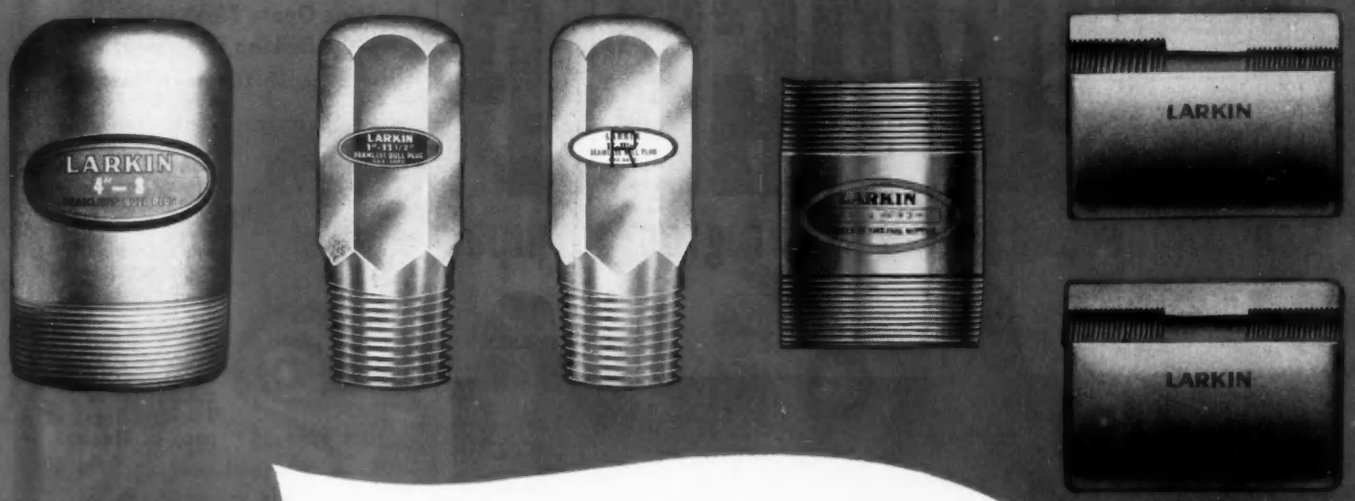
TUBE-KOTE PIONEERS IN PLASTIC SINCE 1939



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St. Louis, Mo.

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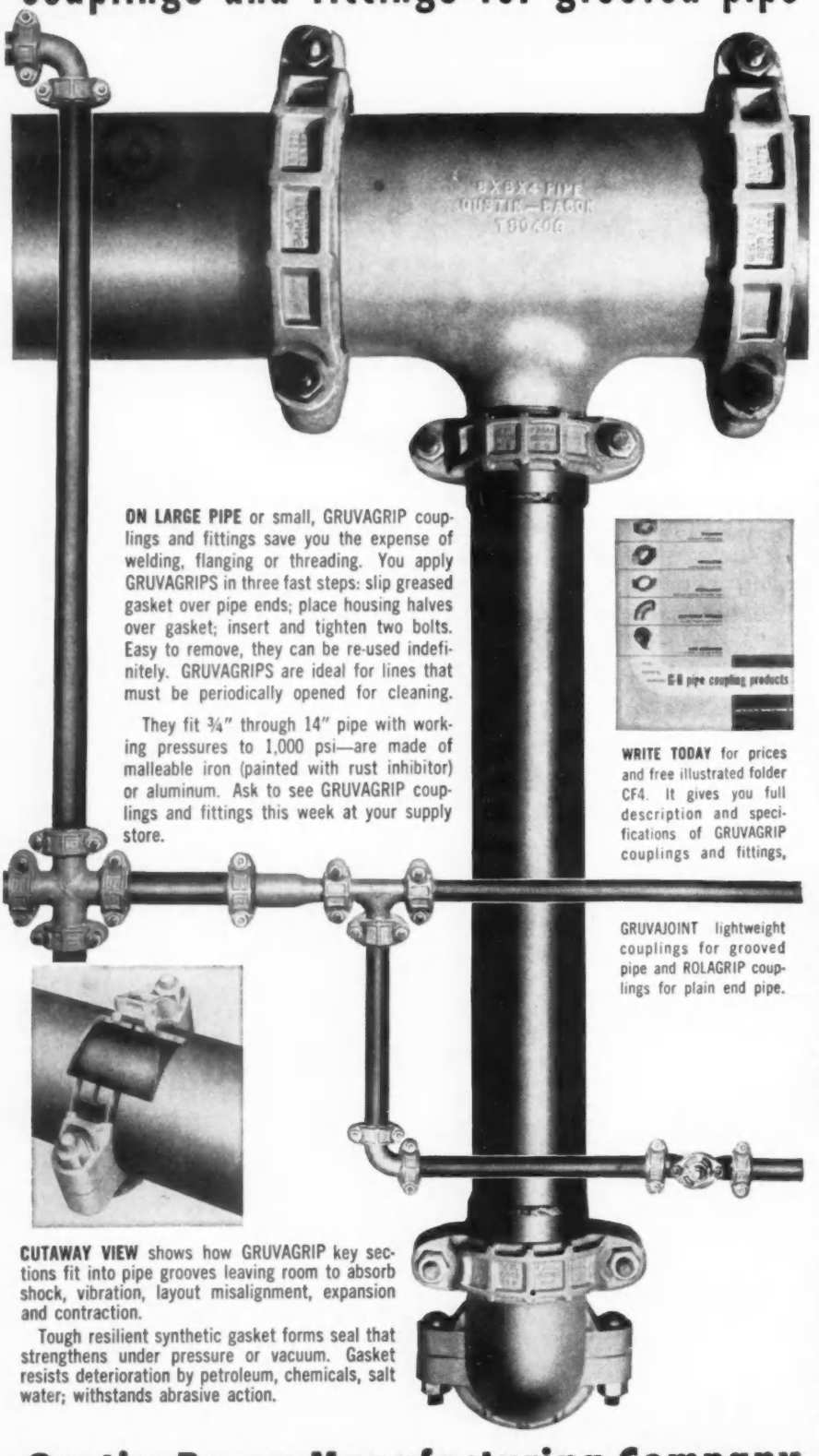
Available Everywhere... ...Through Your Supply Store

GRUVAGRIP

couplings and fittings for grooved pipe



ON LARGE PIPE or small, GRUVAGRIP couplings and fittings save you the expense of welding, flanging or threading. You apply GRUVAGRIPS in three fast steps: slip greased gasket over pipe ends; place housing halves over gasket; insert and tighten two bolts. Easy to remove, they can be re-used indefinitely. GRUVAGRIPS are ideal for lines that must be periodically opened for cleaning.

They fit ¾" through 14" pipe with working pressures to 1,000 psi—are made of malleable iron (painted with rust inhibitor) or aluminum. Ask to see GRUVAGRIP couplings and fittings this week at your supply store.

WRITE TODAY for prices and free illustrated folder CF4. It gives you full description and specifications of GRUVAGRIP couplings and fittings,

GRUVAJOINT lightweight couplings for grooved pipe and ROLAGRIP couplings for plain end pipe.

CUTAWAY VIEW shows how GRUVAGRIP key sections fit into pipe grooves leaving room to absorb shock, vibration, layout misalignment, expansion and contraction.

Tough resilient synthetic gasket forms seal that strengthens under pressure or vacuum. Gasket resists deterioration by petroleum, chemicals, salt water; withstands abrasive action.

Gustin-Bacon Manufacturing Company

210 West Tenth Street Kansas City 6, Missouri

Joe Stine Opens Plant To Make Drilling Equipment

Joe Stine

Joe Stine of Houston has recently opened his own machine and fabricating plant for the manufacture of oil well drilling specialties and drilling rig equipment. Stine has been for 20 years furnishing such equipment and service to the oil industry.

Prior to opening this new shop Stine was for eight years president and general manager of S & R Tool and Supply Company of Houston.

Franklin Supply Company Elects Officers; Opens New Stores

Jene Harper, Chicago, was elected president of Franklin Supply Company recently. Other officers include Roy Wood, Chicago, vice president; Leland Strouse, Dallas, vice president; Lawrence Harper, Tulsa, vice president; Albert J. Mitchell, Chicago, treasurer, and William P. Quan, Chicago, secretary.

Harper announced the board's decision to establish two new oil field supply stores at Fort Morgan, Colo., and Newcastle, Wyo. The appointment of William Kerin to the newly-created post of general store manager was approved. Kerin's position as store manager at Oklahoma City was filled by Jack Carroll.

It was also announced that Franklin Pipe and Supply, Ltd., Canadian subsidiary, is opening a sales office in Calgary, Alberta.

Otis Engineering Appoints John V. Fredd Project Engineer

John V. Fredd

John V. Fredd has been appointed project engineer of Otis Engineering Corporation, manufacturing affiliate of Otis Pressure Control, Inc., in Dallas, Texas. He was formerly Otis' senior design engineer.

Fredd joined Otis in 1947 after seven years with the AC Spark Plug division of General Motors Corporation.

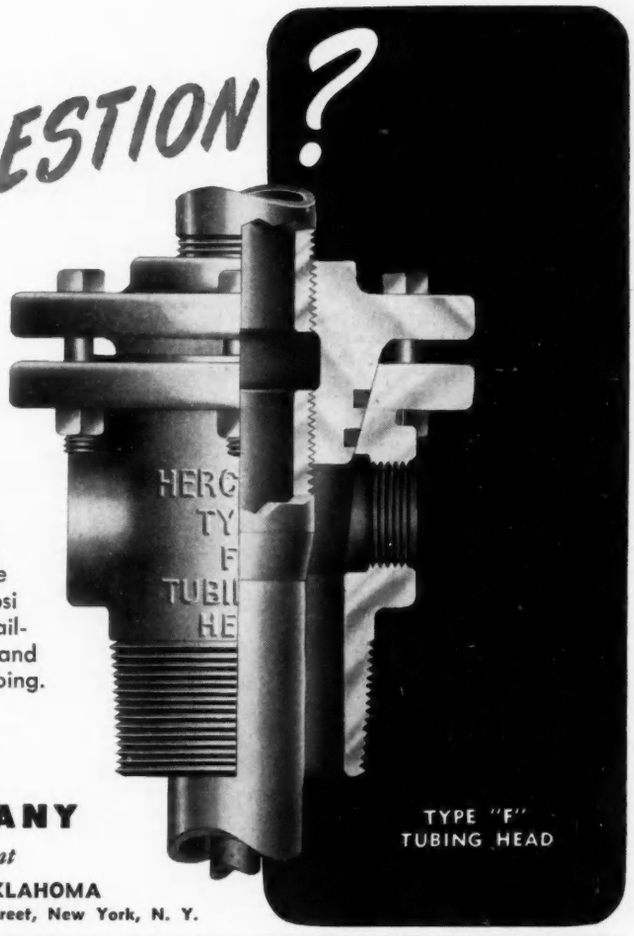
He is now directing work on Otis permanent completion equipment, pipe line calipers, various two-zone completion tools and subsurface production equipment for flowing and pumping wells.

Hercules Powder Company Announces Personnel Changes

Hercules Powder Company has made the following changes in the personnel of of the explosives department: Clifford T. Butler, works manager since 1946, has been named assistant director of operations. Butler joined Hercules in 1929 as a chemist.

E. St. Pierre Bellinger was named works

IS CO$T THE QUESTION?



Then the Hercules "Type F" Tubing Head is your answer. This compact (approximately 11" high) mandrel-type head is constructed of electric cast steel and packed off with "O" Rings. The bolted flange and mandrel are cast in one piece for ease of installation. Tested to 2000 psi hydrostatically. 2" side outlets furnished. Available in casing sizes from 4½" OD to 7" OD and will suspend 2", 2½" or 3" plain or EUE Tubing.

SOLD THROUGH ALL SUPPLY STORES

Write for complete information

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SINCE 1924

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manager at Hercules to succeed Butler. He has been works manager at Bessemer since 1946.

Named to replace Bellinger at Bessemer is John C. Foster, who has been works manager since 1952 at the government-owned Radford Arsenal.

William E. Howell will replace Foster at Radford. He has been assistant works manager at Radford since 1950.

Duard H. Little, production manager at Radford, has been appointed assistant works manager there.

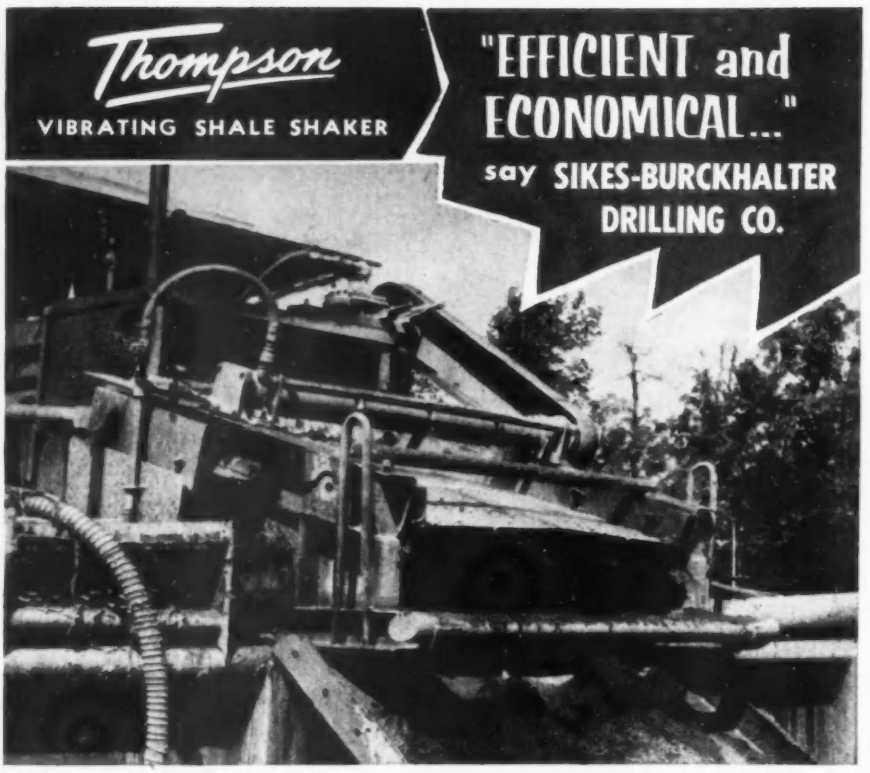
John R. Ryan has been appointed manager of explosives operations. He has been technical assistant in the Explosives Department since 1951. He joined Hercules in 1940.

Edward L. Ramer has been advanced to manager of detonator operations. He joined Hercules in 1935 as an engineer at the Wilmington office.

Herbert W. Jervis has been named director of Hercules' Traffic Department. Having served as assistant director of the department since 1952, he succeeds Morris W. Sheppard, who has retired. Named to replace Jervis as assistant director is Alexander W. Fraser.

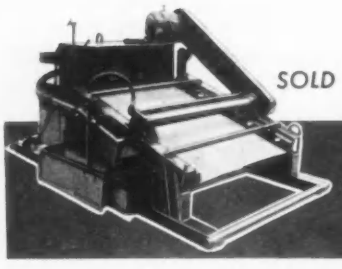
Ladish Company Acquires Assets Of Tri-Clover Machine Company

Ladish Company of Cudahy, Wis., has acquired the assets of Tri-Clover Machine Company of Kenosha, Wis., by purchase of its capital stock. Tri-Clover Machine Company, with plants in Kenosha and Cudahy, will operate as a division of Ladish Company.



Sikes-Burckhalter Drilling Company describes the new THOMPSON Vibrating Shale Shaker as "efficient and economical." . . . and you'll agree when you've seen it in operation. Because the THOMPSON Shale Shaker brings you many exclusive features *not found on any other shale shaker* as well as the famous THOMPSON rugged construction that means long, trouble-free life. CHECK the new THOMPSON Vibrating Shale Shaker TODAY . . . *see why you can get more* with THOMPSON Shale Shakers and Separators.

For Complete Details
Write for Bulletin



SOLD THROUGH SUPPLY STORES — EVERYWHERE

Thompson TOOL CO.
IOWA PARK, TEXAS

Mid-Continent Supply Appoints C. C. Harris District Salesman

C. C. Harris has been promoted from manager of Mid-Continent Supply Company's Great Bend, Kansas, location to district salesman in Great Bend.

C. C. Harris

Harris joined Mid-Continent in 1948, starting at the Great Bend store. Later, he served the company at Plainville, Kansas, as store manager. In 1953, he returned to Great Bend as store manager. In addition to his experience with Mid-Continent, Harris has 11 years' experience with other oil and oil field supply companies.

Lane-Wells Expands Home Office and Plant

General expansion of the home office and plant facilities of Lane-Wells Company in Los Angeles, and the enlargement and more efficient use of buildings have been announced by Rodney S. Durkee, president.

The Engineering and Patent departments have been enlarged, new test pits and other facilities installed. The Sales department has been moved to new and enlarged quarters in its own building, the Shipping department and Steel Storage departments have been reorganized and other changes made.

Lane-Wells Announces Gulf Coast Appointments

Several supervisory appointments in the Gulf Coast area have been made by Lane-Wells Company.

Oliver J. Guseman, formerly assistant to the Gulf Coast division operating superintendent, has been appointed assistant Gulf Coast division operating superintendent. John C. Wilson, formerly assistant to the Gulf Coast division radioactivity engineer, has been named assistant Gulf Coast division radioactivity engineer.

Courtney J. Ritchie, formerly district sales engineer at Abilene, Texas, has been appointed district sales engineer at Gainesville, Texas, and transferred to that location.

Grove Regulator Company Opens New Orleans Office

Grove Regulator Company has announced the opening of new offices at 504 Delta Building in New Orleans, serving markets in the area for the new Grove Seal-"O"-Ring gate valves. W. J. Hancock has been appointed district manager in office.

W. J. Hancock

Hancock was in Grove's Corpus Christi, Texas office, prior to the New Orleans appointment. Since graduation from Texas A. & M. College, Hancock has served in sales engineering and other capacities connected with the oil and gas industries.

STILL THE MOST ADVANCED FRACTURIZING FLUID!

WESTERN Dolofrac*

For oil and gas wells, Dolofrac was the *first* fluid to combine fracturing and acidizing in one treatment with these special properties:

- 80% by volume of retarded 15% acid.
- Assured internal breaker for faster clean-up.
- De-emulsifier preventing spent acid - oil emulsion.
- Preferential wetting properties . . . leaves your formation oil wet — not water wet.
- Non-swelling, non-precipitating characteristics.
- High penetrating, low surface tension qualities for deeper penetration . . . easier clean-up.

Yes . . . DOLOFRAC was *first!* It was years ahead when introduced 20 months ago . . . it's still the best for oil or gas today. DOLOFRAC will do a better job for you, too!

Ask a Western Engineer to show you Dolofrac's ON-THE-JOB performance records in more than 300 gas wells of the Hugoton and Panhandle fields.

THE WESTERN COMPANY

WESTERN Engineered WELL SERVICES

Engineered Well Services

ACIDIZING	FRACTURIZING
PERFORATING	GAMMATRON
Jet and Bullet	Radioactivity Well Logging

General Offices
Midland, Texas

Oil Well Supply Names Coburn Assistant District Manager

John W. Coburn, manager of the Shreveport, La., stores for U. S. Steel's Oil Well Supply Division has been promoted to assistant district manager, Oklahoma district, with headquarters at Oklahoma City.

John W. Coburn

Coburn joined "Oilwell" at Dallas in 1937 and later that year transferred to the Luling, Texas, store. From 1941 to 1945 he was on leave of absence to serve with the U. S. Army, rejoining the organization at the Shreveport store. He became store manager there the following year.

Schlumberger Establishes New Service Location

A new service location far out in the Mississippi Delta has recently been established by Schlumberger Well Surveying Corporation. Joe Williams is in charge of the new office.

Equipment assigned to the new district is entirely marine, consisting of motor vessels for inshore waterways and several offshore units for use on drilling platforms in open waters of the Gulf. The new location is designed to give more prompt service to over water drilling in the delta area.

Two New Vice Presidents Named by Garrett Oil Tools

D. E. Whittenberg of Houston and Harold L. Brown of Dallas have been elected vice presidents of Garrett Oil Tools, Inc. of Longview, Texas, and have also been appointed managers of sales in two recently created company sales regions.

Whittenberg, formerly manager of the company's Southwest Texas division, is in charge of the southern region encompassing the territories from New Orleans, La., to the Rio Grande River in Texas.

Brown is manager of the northern region which includes East Texas, North Texas, West Texas, North Louisiana, Arkansas and Oklahoma. He was formerly manager of the East Texas and West Texas divisions.

B. F. Krause, former manager of the Texas Gulf Coast division, was made manager of the company's Export division, and also placed in charge of the areas where Garrett products are distributed through independent sales agencies, Krause will also serve as technical coordinator between the Sales and Engineering departments.

Vernon B. Scott, formerly manager of the distributing agency for Garrett Relief Valves, was named manager of the Relief Valve division of the company.

Backus and Gynes to Represent Lucey Products in Shreveport

Lucey Products Corporation has established sales offices at Shreveport, La., in the Ricou-Brewster Building. Sam W. L. Backus and Henry C. Guynes have joined the Lucey organization to operate the new district.

H. (Inky) Wotkyns Joins Abegg and Reinhold

H. (Inky) Wotkyns, formerly vice president of the Mid-Continent division of Baash-Ross Tool Company, has become a new member of the staff of Abegg and Reinhold, manufacturers of VARCO oil well tools.

H. (Inky) Wotkyns

Wotkyns will begin his new duties immediately as Mid-Continent sales manager for VARCO, with headquarters in Oklahoma City where he and his family will reside. Wotkyns comes to VARCO after 18 years with Baash-Ross.

Baash-Ross Tool Company Announces Promotion of Robert L. Flynne

Robert L. Flynne has been appointed secretary-treasurer and controller of Baash-Ross Tool Company.

Flynne originally joined Baash-Ross as chief accountant headquartered in the Los Angeles Office. Several years later he was elevated to assistant controller, then served as assistant secretary-treasurer before his latest appointment.

Flynne, a native of Washington, is a graduate of the University of Southern California. After serving for several years as chief accountant for a tire machinery company, Flynne became a naval officer in charge of Supply and Disbursing operations during World War II.

entertaining and informative . . .

Books For and About Oilmen

Here are books that bring to life all the excitement, action and warm human interest found in the story of oil. These books are as exciting as they are factually sound. You'll find easy, entertaining reading combined with practical information. Everyone connected with the oil industry will find real value and interest in these books.

Petroleum in the Western Hemisphere
Western Hemisphere Oil Study Committee of IPAA
This book contains exhaustive reports on past, present and future trends in: 1) petroleum production, productive capacity, and reserves; 2) Hemisphere supply and demand; 3) industry materials requirements; and 4) governmental policies and laws in oil producing countries as they affect petroleum operations.
price . . . $2.50

Spindletop
By James A. Clark and Michel T. Halbouty
For the first time the true story of the event leading up to the greatest oil discovery in the world, and its impact on the lives of all Americans since 1901, is completely revealed.
price . . . $3.95

Corduroy Road
By Wallace Davis
This is the story of Glenn H. McCarthy—the dramatic rise from "rags to riches" of the man called the King of the Wildcatters.
price . . . $5.00

Oil: Titan of the Southwest
By Carl Coke Rister
An exciting account of one of the most spectacular series of events in American history: the rush for oil riches in the great Mid-Continent and Gulf Coast producing areas, from the era of the Indians' oil springs to the present more orderly but equally dramatic period of exploration and development.
price . . . $5.00

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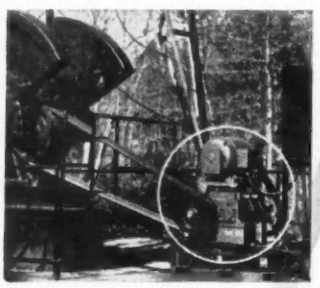
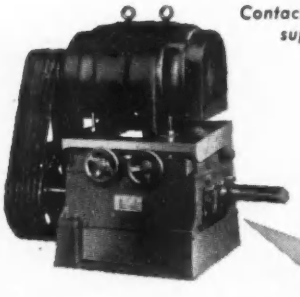


Typical oil field installation on single reduction pumping unit pumping 10, 13, 16 and 19 SPM.

New!
VARY SPMs at the TWIST of a WRIST!
4-SPEED TRANSMISSION 1 THRU 60 H. P. FOR ALL TYPES and SPEEDS of ELECTRIC MOTORS and GAS ENGINES

Consider these applications and problems! Single Reduction Pumping Units—Pump as slow as conditions require—Double Reduction Units too—Tri-Plex and Centrifugal Pumps for Water Flood—Offers 4-Speed Flexibility—Pipe Line Gathering Pumps—Correcting Cold Weather Difficulties—Repressuring Plants—Geared Powers—Refineries—Drilling Rig Accessories—All Turner Transmissions are especially designed and guaranteed for continuous Oil Field Duty.



Contact your local oil equipment supply store or write:

TURNER UNI-DRIVE Company
3418 Terrace Street Kansas City 8, Missouri

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RATES: Regular Classified (undisplayed) set in this size type: 12 cents per word. Minimum charge, $3. Blind box address in our care counts six words. Replies forwarded without charge. **Situation wanted** ads, 6 cents per word. **Display ads,** set in suitably larger type with ruled border, $12 per column inch; situation wanted display ads, $6 per column inch. Ten percent discount for two or more insertions of same copy in consecutive issues. **All classified ads payable in advance. COPY DEADLINE:** 5th of month preceding date of issue. Send copy and checks to: **Trading Post Section, World Oil, P. O. Box 2608, Houston, Texas.**

FOR SALE

WILSON ATLAS
Sales Price—$21,000.00

Equipped with two L1-600 Cummins Diesel Engines in good condition: includes pump drive, 12 PD groove sheave and V-belts. One American cathead and one plain spool cathead. Compound enclosed oil-bath. Includes one 1000 gal. fuel tank. Contact Cardwell—Houston.

GASOLINE PLANT
FOR SALE

Gasoline Plant, located in Brazoria County, Texas, shut down in January, 1954. Had been processing approximately thirty-three million feet of gas daily with absorber pressure approximately six hundred thirty pounds. Plant recovered Propane, Butane, Gasoline, Kerosene and Diesel Oil. Adequate storage tanks for all products. Drum Lead Blending Plant. Detailed inventory available upon request.

SOUTHERN PRODUCTION CO., INC.
P. O. Box 670, Ft. Worth, Texas

FRANKS MODEL 5000 Spudder—Serial No. 866
Sales Price—$7,500

Equipped with one Cummins HB1-600 Engine in good condition. Brake rims in fair condition; Brake blocks—Good. General appearance—Good. Chains—Good. Basic Machine equipped with Spudding attachment, Skid and 65′ Double Leg Pipe Mast with 8⅝″ and 7″ Pipe Legs; 4-Sheave Crown of Wilson Manufacture. Price includes Mast Guy Lines.

Location of Unit—Western Kansas
Contact Cardwell—Wichita

WILSON GIANT—Serial No. 6383
Sales Price—$6,000

Equipped with Two Waukesha 145 GK Engines in good condition. General appearance—Fair. Rig used for Work-Over. Price includes Kelco Spinning and Foster Breakout Catheads; Stromberg-McCreary Air Starters on Engines. Brakes circulating water-cooled; Manual Friction Clutches in Transmission; Others—Jaw Clutches. Rig has Slush Pump Drive and Rotary Drive.

Location of Unit—Lake Charles, Louisiana
Contact Cardwell—Houston

For Sale

EMSCO GB 800 RIG

This rig fully equipped with many extras. Less than 45,000′ of hole drilled with rig and accessories since new. Inventory includes grooved drum, dynamatic brake, heavy duty mast, 12 foot substructure, 2 pumps including Gardiner Denver 800 H.P. GXR, 3 LRDU Waukesha Diesel Engines, Steel Mud Tanks, 4½″ Grade E Hand Banded Drill Pipe, 6¼″ and 7¾″ Drill Collars. This rig is priced right. For details contact Box 32-W, c/o WORLD OIL, Houston 1, Texas.

FOR SALE

■ FOR SALE. Coring reel, heavy duty, skidded; handles 15,000 ft. of line. Oil Well transmission powered with 150 hp Waukesha engine. Excellent condition. Weight approximately 24,000 lbs.

*****

5x12 Wilson-Snyder power pump. Excellent condition, skidded and ready to go.

*****

20″ Oil Well steam pump, steel fluid end.
Call or write T. D. McCandless, P.O. Box 2112, Houston. CEntral 7301 or MElrose 6764.

■ 3000 feet 3½ inch EUE range 2 drill pipe, casing protectors, 400 feet brand new, rest drilled only 4000 feet. Make bid or inquiry. Box 33-W, c/o WORLD OIL, Houston 1, Texas.

■ Trucking, Kansas, oil field hauling, grossing over $300,000 annually. This place started with one truck and is now leader in the field. Owner's health forces immediate retirement. Would you buy headaches to make real money? Books open to responsible buyer to show net profit. Priced to sell. C-4042, CONTINENTAL, 804 Grand, Kansas City, Missouri.

■ Sohio Petroleum Company solicits offers to buy its full working interest in the Bolton Water Flood, Montgomery County, Kansas. Bartlesville Sand produced 1906 Bbls. of oil in June, 1954. Average Depth Wells—1200′. 29 Producing, 43 Water Input, 33 Temporarily Abandoned, 1 Water Supply Well, Water Treating Plant, Water Distribution System, Complete Electric System, Buildings and Equipment. For inspection and complete specifications contact: Sohio Petroleum Company, 1300 Skirvin Tower Hotel, Oklahoma City, Oklahoma, Attn: J. R. Wilson, Jr. Phone REgent 9-0511.

FOR SALE: Unit 10 and unit 15 complete power rigs in excellent condition—new drill pipe — priced reasonable — $175,000.00 in new equipment used less than six months — will show or furnish inventories to interested parties.

VERNON WHITLEY DRILLING COMPANY
Telephone 2-2212 **Tyler, Texas**

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AVOID DRILLING DRY HOLES

It pays . . . to know . . . where the oil accumulation lies . . . before you invest, lease or drill.

CARRILLO'S electronic method for oil exploration is capable of detecting the presence of an oil accumulation . . . directly.

CARRILLO'S surveys put the drill on the oil.

For information or service write to CARRILLO, P. O. Box 75685, Station S, Los Angeles 5, California.

OIL LEASES

■ 20,000 ACRES IN IDAHO. Good geology. Oil and gas proved in area recently less than 2,000 feet. YOUNG AND CRITCHLOW, 1975 NW Everett Street, Portland, Oregon.

■ WANTED: Some reliable partners to help drill on twelve hunderd acre block of leases. One offset well showed twenty foot saturation at one thousand feet. Other gas wells close by. Five year leases. Four rigs running close by. Proven structure cost about five thousand per hole, or will sell. Have small gas system will sell. Plenty gas available. Reference. Write Walter Wooden, Bonnieville, Ky.

SITUATIONS WANTED

RADIO ENGINEER with first-class 'phone license, five years in geophysical work, extensive experience in two-way VHF, Shoran, radar operation and maintenance available September 1st. Capable of directing large VHF, microwave installation or maintenance work. Address inquiries Box 34-W c/o WORLD OIL, Houston 1, Texas.

BUSINESS OPPORTUNITIES

Well organized, well established oilwell drilling contractor desires the management and supervision of oil properties in West Texas, Central Texas, and New Mexico. Can provide complete handling of oil properties, from acquisition to production. No properties too small, and none too large to handle. Inquiries from independents, groups, small or medium sized oil companies invited. Write, wire, or call collect for further information.

MAKIN DRILLING COMPANY
P. O. Box 1628 — 146 Allen Building
Hobbs, New Mexico — Midland, Texas
Phone 3-3141 — Phone 2-2962

■ HAVE 9200 acre block in Harding County, New Mexico. Wish to contact interested parties to help develop. Drilling contractor also desired to participate as partner. Contact J. J. Enkich, 1207B No. Osage Dr., Tulsa, Okla.

■ Churn drilling machine wanted similar to Bucyrus-Erie 24-W or 24-L or 60-L; also another machine comparable to Bucyrus-Erie 28-L. Please give full information as to condition, location and price. Sydnor Pump & Well Co., Inc., P. O. Box 1476, Richmond, Va.

GEOPHYSICAL SERVICE

OIL LOCATING SERVICE!

Determine approximate depth and thickness of oil zones. Drilling locations pin-pointed. NO OTHER GEOPHYSICAL WORK NEEDED! Documentary proof of success. WORTH INVESTIGATING! YOUNG AND CRITCHLOW, 1975 NW Everett, Portland, Oregon.

■ GEOLOGICAL MAPS and FILM. West Texas and southeast New Mexico. Scale 1″ = 8,000′. One set Permian datum, one set Pre-Permian datum. Sample and electric log datum. (Also film without datum). BASIN OIL MAP SERVICE, 1600 Bedford Drive, Midland, Texas.

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SQUEAKS from the BULLWHEEL

The Trap

Shirley was racing around the porch with the neighbor's son close at her heels.

"Why are you chasing her?" Shirley's father asked.

"She pinched me," he replied.

He turned to Shirley. "Why did you pinch him?"

Blushing prettily she whispered to her father, "So he would chase me."

Easy Admittance

A little boy, caught in mischief by his mother, was asked, "How do you expect to get into Heaven?"

The lad thought a minute then replied: "Well, I'll just run in and out and in and out, and keep slamming the door until St. Peter says, 'For heaven's sake, Bobby, come in or stay out!' "

Of course she isn't my mother! She owns ⅛ of this well and says she's gonna stay here 'til we hit or plug it.

"You'll get a WHALE of a lift - wi' McKISSICK!"

McKISSICK

Heavy Duty

SNATCH BLOCK

For Dependability

★Heavy steel construction throughout for extra weight. 6"-8"-10" sheaves grooved to any line size.

★2" diameter center pins, Hi-Load roller bearings, Hi-Speed bronze bushings.

★Side plates bolted at three points, minimizes tendency to spread.

McKISSICK

McKISSICK PRODUCTS CORPORATION
Box 2496 Tulsa, Oklahoma

The Real Truth

Rich Young Man: "Why does a talented, beautiful girl like you dance in a run-down, sordid place like this?"

Girl: "I don't know unless it's because I meet a lot more prominent, eligible, rich men like yourself than I did as a librarian."

•

Old So Soon

A five-year-old had gotten a terrible sunburn and it was beginning to peel. One day his mother heard him muttering to himself as he washed his face: "Only five years old and wearing out already."

•

Necessities of Life

The man was explaining about his wages like this:

"After you figure food, clothes and rent I've got only $60 left for the necessities of life and about half the time they ain't half fit to drink."

•

Bargain

A prospective groom went into a jewelry store.

Salesman: "Would you like to see our special three-piece combination?"

Young man: "What's that?"

Salesman: "Engagement, wedding and teething!"

•

Think, Man!

The farmer's daughter and another farmer's son were walking along a road together.

The lad was carrying a large pail on his back, holding a chicken in one hand and a cane in the other and leading a goat. They came to a dark lane.

Said the girl: "I'm afraid to walk here with you. You might try to do something that's not very nice."

"How could I, with all these things I'm carrying?"

"Well, you might stick the cane in the ground, tie the goat to it and put the chicken under the pail."

Look at the Hole Pattern . . .

holes are exactly the same pattern as the chambers in the gun

. . . must be a McCULLOUGH M-3 BULLET GUN

Simultaneous firing means more holes per foot, no bunching of shots, less perforating down time, and MORE PENETRATING POWER. Whatever your perforating problem, call for the M-3 BULLET GUN or the GLASS JET PERFORATOR. For *all advantages* write for your copy of "How to Get More Oil".

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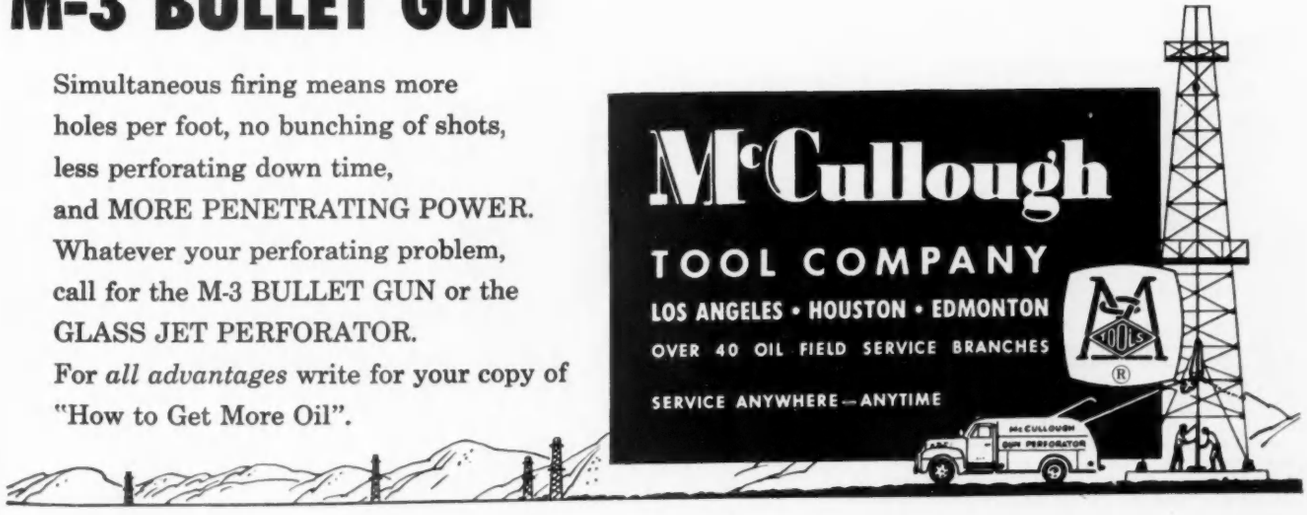
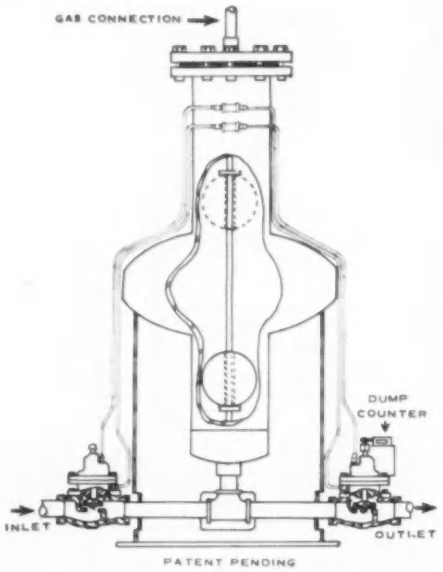
TOOL COMPANY
LOS ANGELES • HOUSTON • EDMONTON
OVER 40 OIL FIELD SERVICE BRANCHES
SERVICE ANYWHERE—ANYTIME



FOR BEST RESULTS LOG AND PERFORATE BY McCULLOUGH



PATENT PENDING

ROLOCHECK

TRADE MARK

The New Oil Well Meter

A new oil well meter has been developed which is simple in design, yet very accurate and eliminates expensive maintenance problems caused by gas, sand and other solids in crude oil. The meter has a high maximum rate and features a zero minimum rate. The new Model No. RM 1-24 will handle as much as 1,440 bbl. per day at 12 psi.

Gas and Sand will not affect the new meter any more than it would affect normal control valves in oil lines. The meter actually dumps a positive calibrated dump each time. It may be installed on existing heater-treaters, vertical or horizontal separators. The Rolocheck meter eliminates liquid level controls on the separator as it actually controls the liquid level in the vessel.

OPERATION

(1) Filling: When float hits lower stop, pilot trips to close outlet valve and open inlet valve simultaneously.

(2) Dumping: When float hits upper stop, pilot trips to open outlet valve and close inlet valve simultaneously.

ACCESSORIES

GAGE, COCKS, GLASS, & GUARD RODS
0-200 THERMOMETER & WELL

SPECIFICATIONS

Type	1-24
Working Pressure	150 PSI
Capacity B.P.D.	MIN.—O. Max.—1440*
Height	4'-6"
Width	2'-0"
Weight	356 Lbs.
Gas Connection	1"
Oil Outlet	1½"
Oil Inlet	1½"

*At 12 Psi. Pressure Differential. Available with 2" Valves for greater capacity.

ROLO MANUFACTURING COMPANY

P. O. Box 6763, Houston 5, Texas

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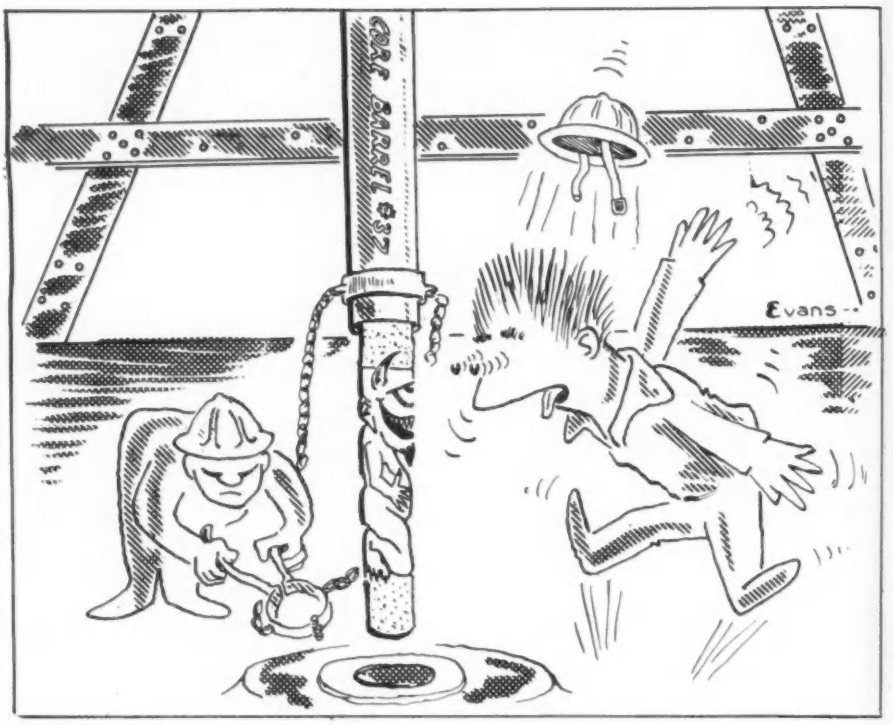

Not a Woman's World!

"Mama, if I get married will I have a husband like Daddy?"

"Yes, dear."

"And if I don't get married will I be an old maid like Aunt Minnie?"

"Yes, dear."

"Mama, it's a tough world for us women, isn't it?"

•

Mixed Up

The attorney tried to get the witness, an ample negro woman, to give her age, which she insisted she did not know. Finally the lawyer asked the court for help.

"You will have to answer," the court ordered.

"But I keeps tellin' you all I don't know," the witness insisted.

"This court will not have such an answer. Surely you know how old you are."

"Judge, it's like this. I keeps gettin' my age and my bust measure mixed up."

•

Some Stairs!

The two guys were walking off the effects of a big party when they accidentally found themselves stumbling along a railroad track. After trudging along for some time, one commented: "This is the longest set of stairs I ever tried to climb."

"Sure is," complained his companion. "And why do you reckon they made the banisters so low?"

"I used to be a production engineer, and I liked it. Always somethin' to do - trouble to iron out - somethin' keepin' me on my toes always. Then I started usin' LANE-WELLS PACKERS - everything changed - no trouble - no foul-ups - everything peaceful. I tell you, Doc', this inactivity is drivin' me crazy!
Lowmac
CP-701

You can get your drill string when you need it... and

CUT YOUR INVENTORY IN HALF BY USING REED SUPER SHRINK-GRIP TOOL JOINTS

Tool joints account for about 50% of the cost of your drill pipe equipped with tool joints.

Why tie up this capital when you can stock your drill pipe *only?*

THEN...

When you need your string, buy your **REED SUPER SHRINK-GRIP TOOL JOINTS** and apply them to the pipe in a few days... **AT YOUR LOCATION**

REED ROLLER BIT COMPANY
HOUSTON 1, TEXAS

THE MARK OF QUALITY

5193

The Saddest Tale

Three men assigned to a room on the 30th floor learned that the elevator was out of order. To occupy their minds during the climb they devised a plan whereby the first man would tell funny stories for the first 10 flights; the second, adventure tales for the second 10 flights and the third, sad experiences for the last 10. With their laughter, the first 10 flights were easy. And the same for the next 10. At the 21st floor, the third man was silent.

"Let's have those sad stories," he was urged.

"All right, I'll tell the saddest of all tales first," he said. "I forgot the key."

•

Durability

Mr. Tight was having a suite of handicraft furniture made, and was carefully watching every detail of the mechanic's procedure. When a worm-eaten piece of hardwood came through the craftsman carefully filled the holes and sanded the surface, upon which the following conversation took place:

Mr. T.: "What's that you put in those holes?"

Craftsman: "That's putty; that stuff never rots."

Mr. T.: "Then why in the world didn't you make it all out of putty?"

CONTACT YOUR FAVORITE SUPPLY HOUSE

STANDARDIZE ON

PARMACO PRODUCTS

•

THEY SATISFY

•

PARKERSBURG MACHINE CO. PARMACO PARKERSBURG, W. VA. U.S.A.

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Since 1915

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SAND AND CEMENT

"Placed by Air"

We have the equipment, personnel and experience to complete any and all GUNITE work regardless of size or location.

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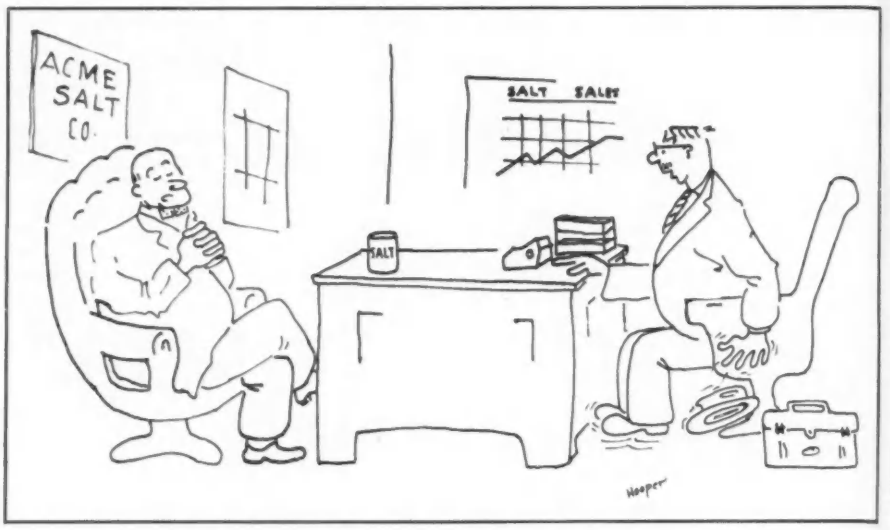

To tell the truth, Mr. Botts, I got my start in the oil business . . .

Pretty Good Evidence

"Are you positive the defendant was drunk," growled the judge, "and why are you so certain?"

"Well," replied the officer, "I saw him put a penny in a patrol box and look up at the clock on the city hall and shout, 'Gad, I've lost 14 pounds.' "

•

Better Suggestion

Watching an inebriated man try without success to unlock the door to his house, a policeman asked if he could handle the key for him. "No thanks," the man replied. "I can hold the key—you hold the house."

•

Faux Pas

Husband and wife conversation overheard at the golf outing in September:

"I'll never go anywhere with you again, as long as I live."

"Now what did I do?"

"You asked Mrs. Smith how her husband was standing the heat and he's been dead for two months."

•

Unknown Strength

A severe air raid in London during the war had rescue teams out in full force. Suddenly one group saw a beautiful girl, sans apparel, sitting in a bathtub in the midst of a wrecked house. In a dazed condition, not moving, she was muttering to herself, "I can't understand it, I simply can't understand it."

"What can't you understand?" one rescuer asked.

"I just can't understand it," she said. "All I did was pull the plug and the whole house came down."

•

Different Story

Wife (on returning from party): "Why is it I buy a beautiful evening gown and you never even notice it but you get popeyed staring at every other woman in the place?"

Husband (sleepily): "Once you know what's in the package, it doesn't matter how its wrapped."

•

The Sure Way

"Daddy," he asked, "is my kitten a man kitten or a lady kitten?"

Everyone on the bus listened.

"A man kitten," said the father.

"How do you know?" the child persisted.

You could have heard a pin drop as the father promptly replied, "Well, he has whiskers, hasn't he?"

•

Age of Innocence

A small boy was seated on the curb with a pint of whiskey in his hand, reading "Esquire" and smoking a big cigar. An old lady passed and asked, "Little boy, why aren't you in school?"

The infant replied, "Damn it, lady, I ain't but four."

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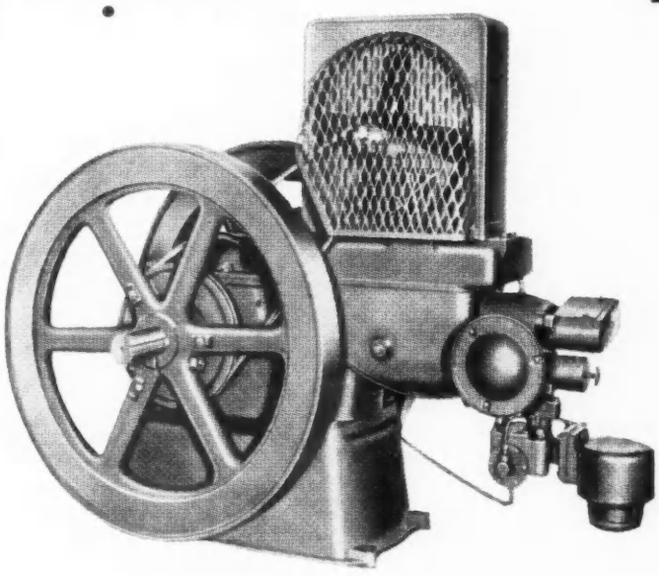
•



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ZC Engine operators have learned by experience to fully appreciate the many desirable features of these engines. They have discovered that the "ZC" will do a better job at less cost than many higher priced pumping engines. They know about the trouble-free cooling system—about the easy starting—even on the coldest mornings, and about the low oil consumption and fuel economy.

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One-Specification Piping Connection

A new connection has been designed which offers industry the first "one specification" connection for all piping applications and pressure ratings. It is a "one specification" connection because it requires no selection of gaskets, facings or bolts, all parts being fully interchangeable and re-usable. Developed by Gray Tool Company, with patents applied for and registered under the trademark GRALOC, the connection employs a two-bolt clamping principle and a stored energy seal.

A steel sealing ring, having flexible lips and a rigid rib fits between the steel connecting hubs. The angle of the tapered lips of the ring is less than the tapered seats of the hubs. As the joint is made up, the lips of the seal ring conform to the seats of the hubs, thereby utilizing the elasticity of the steel as a source of stored energy to effect and maintain a positive seal. Internal line pressure serves to increase the effectiveness of the seal without creep or movement.

Instead of the usual bolting, GRALOC uses a two-piece steel clamp which works against tapered shoulders on the connecting hubs. The clamp is held in place by two high-strength steel bolt studs made to ASA specifications.

The connection will far exceed the pressure limits and bending moments in the heaviest wall pipe. Because it is of all steel construction, expansion or contraction does not affect the seal. It is leakproof when used with any fluid at any temperature the pipe is capable of carrying, including light hydrocarbons, steam and even low molecular weight gases.

Standard GRALOC connections are made in three styles: butt welding, slip-on and threaded, in a range of sizes from 1½-inch to 12-inch for all standard weights from schedule 40 through schedule 160 or XX strong. They can be made for Super Pressure applications and of heat and corrosion resistant material.

For more data, circle **No. E1** on Readers' Service Card, last page this issue.

Receiver-Integrator Unit

A new receiver-integrator for graphic panels has been announced by The Foxboro Company for use with the company's line of compact Consotrol instruments. A pneumatic-electric instrument, the new Type 224 receiver-integrator computes an accurate and continuous total of any process flow and operates a small counter located in the graphic display. The integrator consists of two small, self-contained units: a remote counter and a flow receiver. The counter can be mounted on the front of a panel, usually in conjunction with a Consotrol strip-chart flow recorder. It totalizes to eight digits (or to six digits with zero reset wheel) yet occupies only 3½ inch by 5½ inch of panel space. The flow receiver unit, composed of a receiver bellows and a cam-switch assembly, is housed in a small metal box behind the panel. Two wires connect it to the counter.

In operation pneumatic measurement signals (3-15 psi) from a flow transmitter at the process are received by the bellows which then positions the cam-switch mechanism. The cam-switch, in turn, produces an electric impulse to actuate the counter in precise and constant relation to the flow measurement. Integrators are available for uniform or square root scales to totalize minute, hourly or daily rates. Service calibration checks can be made during actual operation with no extra equipment required.

(This item supplements The Foxboro Company data on pages 1697-1712 of the Composite Catalog, 20th Edition.)

For more data circle **No. E2** on Readers' Service Card, last page this issue.

DC Welder

With the addition to their line of a new low cost 250 ampere DC arc welder with a four cylinder air cooled engine, Hobart Bros. Company now offers a choice of liquid or air cooled engine driven 250 ampere welders.

The generator of this new 250 ampere arc welder is of the multi range type, with slight modifications to provide less bulk, lighter weight, and low cost in equipment where such features are more important than some of the less essential conveniences provided in the larger Hobart models.

A convenient control panel is located at the generator end of the unit. On this are mounted the large range wheel, volt amp adjuster knob, reinforced bus bar type cable terminals, and power outlet receptacles, as well as the starter button for a battery equipped unit. Engine choke, hand throttle, and magneto switch (on magneto equipped units) are all located at the engine end for convenience in starting.

A power outlet receptacle is provided for use only when the unit is not being used for welding on this particular model.

For more data circle **No. E3** on Readers' Service Card, last page this issue.

Oil Well Meter

A new oil well meter has been developed by Rolo Manufacturing Company. This new meter features simple construction and extreme accuracy and is designed to eliminate expense maintenance problems caused by sand, gas and other foreign matter in crude oil. The meter has a high maximum rate and features a zero minimum rate. It is reported that the Rolocheck Model No. 1-24 will handle as much as 1440 barrels per day at 12 pounds.

The meter can be installed on existing heater-treaters, or vertical or horizontal separators. Sand and gas will not affect this new meter any more than they would affect normal control valves and oil lines. The meter actually dumps a positive calibrated dump each time.

(This item supplements Rolo Manufacturing Company data on page 4394 of the Composite Catalog, 20th Edition.)

For more data circle **No. E4** on Readers' Service Card, last page this issue.

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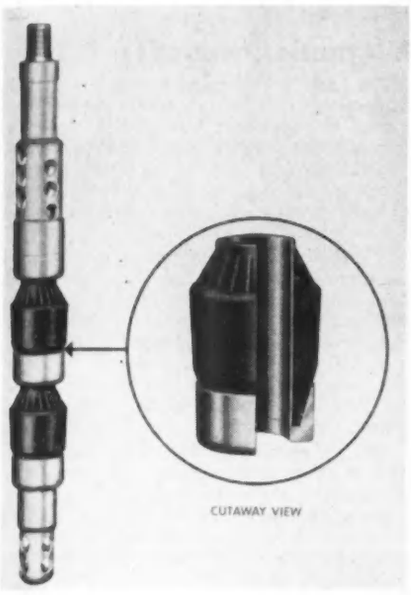
What's New in Equipment



Tubing Swab

A new type of tubing swab developed by Drovil Company combines performance advantages of the cup type of rubber with the added safety that there is no metal exposed to damage the surface of the tubing or to wear out and stick the swab.

As can be seen in the cutaway view, hollow pockets are molded into the rubber swab cups, and these pockets fill with fluid as the swab is raised, thus flexing the swab lip against the inside surface of the tubing for a tight seal. Rubber ribs are moulded integrally with the swab body and cup to reinforce the swab lip and to hold it in axial alignment. These integral rubber ribs eliminate the necessity of metal cages to support the cups thereby assuring that the inside surface of the tubing string will not be damaged.

For more data circle **No. E5** on Readers' Service Card, last page this issue.

Valve Operator

Bettis Corporation is announcing the availability of the Bettis plug valve operator. This is a gas actuated attachment for remote control operation of plug valves. The operator can be easily installed on plug valves in the field without special tools and will readily open and close valves from one inch to four inches. The unit operates on gas pressure of 15 pounds to 100 pounds.

These plug valve operators require only one gas operating line for opening and pressure closing. They are friction-free, having no pistons or packing glands and will fail safe on loss of control pressure.

(This item supplements Bettis Corporation data on page 625 of the Composite Catalog, 20th Edition.)

For more data circle **No. E6** on Readers' Service Card, last page this issue.

Separators

Sivalls Tanks, Inc. is manufacturing a spherical oil and gas separator. The Sivalls spherical separator consists of a ball or sphere setting on a conventional skirt arrangement. The sphere has a well fluid inlet, an oil outlet, a gas outlet, a drain connection, a safety valve, a gauge glass for determining liquid level and a pressure gauge.

Inside there is a special diverter over the inlet connection which directs the incoming fluid tangentially around the shell of the sphere. A guide cylinder and ring is installed adjacent to the inlet. A fluid accumulator compartment, which also serves as a float chamber, occupies the lower portion of the sphere. A ceramic saddle type mist extractor is located in the top of the sphere just under the gas outlet.

Liquid emerging from below the guide cylinder spreads out over the top of the liquid accumulator compartment or float chamber and then moves to the inlet of the fluid accumulator. Oil is discharged through a standard float operated valve.

The oil outlet connection is elevated a short distance above the bottom of the sphere so that mud, silt and gravel will not foul the oil valve. There is a drain connection attached to the center of the sphere's bottom which allows all water and other liquid to be drawn off periodically.

For more data circle **No. E7** on Readers' Service Card, last page this issue.

Tubing Joint

Hydril Company is announcing the availability of Hydril PH-6 tubing joint. For heavy walled, high pressure tubing only, it has been proven to be pressure tight at 15,000 pounds per square inch under drastic and repeated temperature changes.

PH-6 joint was tested to 15,000 psi gas pressure as follows:

1. The complete joint, some samples with light oil lubricant, some with zinc base thread dope.
2. The outside seal only, some samples with light oil lubricant and other with zinc base thread dope.
3. The inside seal only, with light oil lubricant.
4. The inside seal only, with zinc base lubricant.

In all tests, the Hydril PH-6 tubing joint proved to be pressure-tight to 15,000 psi and higher. This new development has been made to meet the demands of the oil industry in the tapping of gas reservoirs at greater depths and higher pressures. These pressures, too high for standard tubing strings, have forced development of heavier wall tubing and thus, in turn, calls for a heavier tubing joint. Hydril PH-6 tubing joints are designed as an answer to this problem.

(This item supplements Hydril Company data on pages 2333-2408 of the Composite Catalog, 20th Edition.)

For more data circle **No. E8** on Readers' Service Card, last page this issue.

Sucker Rod Cleaner

Cleaning sand, grit or other foreign matter from sucker rod coupling threads has always been a problem to the rod crew. Sucker rod pins are easily cleaned with a wire brush but the coupling threads being inaccessible are not cleaned so readily.

The "Little Squirt" sucker rod box cleaner, manufactured by HHM Products is a new, convenient device to clean the coupling threads when rods are being run or removed from the well. With the rod suspended in the derrick or mast, the "Little Squirt" is raised and lowered several times under the rod; at the same time the nozzle with attached nylon bristles is guided into the coupling.

According to the manufacturer, the weight of the rod depresses the piston, causing cleaning fluid to jet with considerable force from the discharge ports in the nozzle. At the same time, the piston with attached brush-nozzle whirls, producing a combination brushing and flushing action.

The complete unit weighs only ten pounds and is made of aluminum with light piston and nozzle. Bristles are pure nylon and manufacturer claims will last indefinitely.

For more data circle **No. E9** on Readers' Service Card, last page this issue.

Log Level Indicator

A new log level indicator, Model LLI, has been announced by Houston Technical Laboratories to aid in seismic "noise" analysis and pattern hole and multiple seismometer shooting. The calibrated, electronic voltage measuring and indicating instrument operates with any standard seismic system, receiving its input from the regular seismometer signals and furnishing output directly to the recording camera.

The log level indicator is so named because its trace amplitude is proportional to the logarithm of the input signal. The LLI trace provides a calibrated indication of signal strength throughout the length of the seismograph record. The LLI trace also is completely independent of Automatic Gain Control and other characteristics of the seismic amplifier, differing materially from AGC traces affected by amplifier characteristics.

Metering circuitry and an internal signal generator facilitates sensitivity calibration in 11 steps from one microvolt to 100 millivolts and accurate adjustment of deflection amplitude. The unit weighs 17½ pounds complete and operates from two self-contained 45-volt batteries and an external 12 volt battery.

For more data circle **No. E10** on Readers' Service Card, last page this issue.

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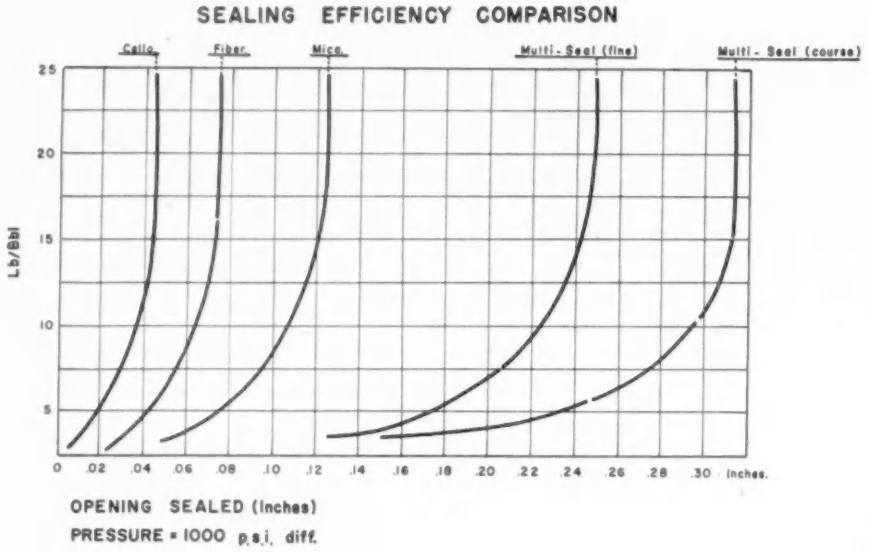
What's New in Equipment



Lost Circulation Material

Marine Exploration Company has announced the development of a new blended lost circulation material. This new granular material, called Multi-Seal, is blended of specially prepared, sized and graded, stone-fruit husks. The material will not ball up, and can be easily mixed through a hopper, or pumped into the mud pits for introduction into the mud.

The outstanding feature of this material is its ability to remain suspended in the drilling fluid. Depending on the severity of the loss to the formation, a maximum sealing effectiveness can be achieved by using a blend of various husks, obtaining a material of varying specific weights which can easily be suspended in muds of different weights. Four or more different particle sizes are used for successful sealing.

The material has no adverse chemical effects on mud and does not interfere with the multiple properties of the drilling fluids.

W. Kulmann, research engineer for Marine Exploration Laboratories, has spent several years in the development of Multi-Seal. The bridging agent is composed of hard particles of bony, woody, or leathery coverings of fruit seeds which have been crushed and granulated. When mixed with the natural outer fiber layer of the fruit husks, this new material penetrates the pores, cracks, crevices and fissures encountered by the mud loosing well bore and forms an effective bridge and an impervious cake or mat of maximum strength and of minimum thickness. The sealing efficiency curve shown gives a comparison of the effectiveness of Multi-Seal added to the mud, in pounds per barrel of mud, under a 1000 pounds per square inch pressure differential.

Because of its angularity, Multi-Seal increases the angle of repose of cement, thus providing an effective material for cementing and squeeze cementing operations. (U. S. Patent Pending).

For more data circle **No. E11** on Readers' Service Card, last page this issue.

Hose Safety Clamp

A built-in safety clamp which greatly increases the safety and strength of rotary hose has been introduced by Goodall Rubber Company of Texas.

The safety clamp is an integral part of the hose. It consists of a metallic sleeve with projecting eyelets which is incorporated into the body of the hose. Because the clamp is permanently built into the hose body, the eye is always in the proper position to hold the hose securely in case of a rupture. The possibility of rupturing is greatly reduced because external abrasion is eliminated. The fitting does not distort or restrict the hose and its passage but actually affords additional reinforcement against distortion.

(This item supplements Goodall Rubber Co., Inc., data on pages 1870-1871 of the Composite Catalog, 20th Edition.)

For more data circle **No. E12** on Readers' Service Card, last page this issue.

Magnetic Inspection Kit

An entirely different magnetic particle inspection kit is being announced by Magnaflux Corporation. Called Y-5 yoke kit, it is designed especially for preventive maintenance inspection, for weld inspection, and for limited volume inspection of any magnetic part wherever surface cracks are suspected.

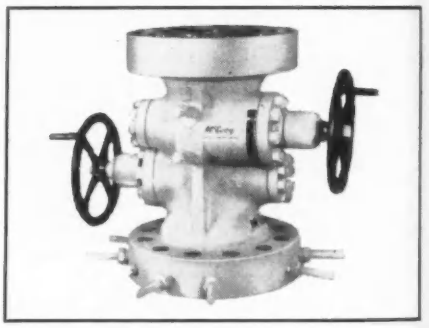
The Y-5 yoke kit comes in a metal carrying case and weighs less than 30 pounds complete. The yoke itself is the magnetizing and testing instrument and weighs only seven pounds. It draws six amps from any 110 volt AC line. Industry will find this new development particularly useful for checking pump parts, valve bodies, welds, collars, etc.

The inspection operation by use of this new development requires only one man. He handles the yoke with one hand, controlling both power and position, and with the other he dusts on the Magnaflux powder. The area covered by each application of the yoke varies up to approximately 24 square inches.

The lightweight and compact features of this new development make it a natural for field use.

(This item supplements Magnaflux Corporation data on page 2996 of the Composite Catalog, 20th Edition.)

For more data circle **No. E13** on Readers' Service Card, last page this issue.



Dual Valve

McEvoy Company recently announced its dual valve, two valves in one for dual completion with two full size tubing strings. Pioneered, engineered, developed and introduced by McEvoy, this valve is to be used principally in the building of trees for production from two or three formations, saving the cost of drilling a second well. The two tubing bores plus the casing annulus can be used as separate and individual pasageways for many combinations of flowing, pumping and/or gas lifting.

This is the first time in the history of the oil industry that a valve body has been so constructed as to house two separate valves with a single connecting flange for the main body which allows two separate tubing strings to be hung independently.

(This item supplements McEvoy Company data on pages 3133-3184 of the Composite Catalog, 20th Edition.)

For more data circle **No. E14** on Readers' Service Card, last page this issue.

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